



© *American Museum of Natural History, N. Y.*  
The Willamette Meteorite found at Portland, Oregon in 1902, is the largest ever discovered in the United States.

# The HOME UNIVERSITY ENCYCLOPEDIA

—An Illustrated Treasury of Knowledge—

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WITH SPECIAL ARTICLES AND DEPART-  
MENTAL SUPERVISION BY 462 LEADING EDITORS,  
EDUCATORS AND SPECIALISTS IN THE  
UNITED STATES AND EUROPE

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# VOLUME X

## Peninsular

**Peninsular War.** For the causes of the outbreak of hostilities between Britain, Portugal, and Spain on the one part and France on the other, see **SPAIN**. Napoleon, having come to a fresh understanding with Alexander I. of Russia, at Erfurt, hastened to Spain, which had been invaded by a British force under Sir John Moore. The death of Moore was a disaster, and was followed by the evacuation of Portugal by the British troops. In April Sir Arthur Wellesley landed in the Tagus, in May effected a passage of the Douro, and on July 27 and 28 fought and won the battle of Talavera. After the battle Wellesley, who was continually hampered by the pride and indolence of the Spaniards, abandoned Spain, and took up a position near Almeida. On June 13 Wellington entered Spain, winning Salamanca on July 22, and occupying Madrid. From August to September, 1813, Soult endeavored, though in vain, to prevent Wellington from crossing the Pyrenees, and numerous battles were fought. The British, however, steadily advanced. On April 4 Napoleon abdicated.

**Penitential Psalms**, a group of seven psalms chosen from the Psalter on account of the marked penitence they exhibit. They are Psalms 6, 32, 38, 51, 102, 130 and 143, of which the 51st (the Miserere) may be regarded as the most characteristic.

**Penitentiary**, in the Roman Catholic Church, is a priest attached to cathedral churches who considers cases of grave sin and imposes the appropriate penance.

**Penn, William** (1644-1718), English Quaker, founder of the colony of Pennsylvania. The goodwill of Charles II. and James II. for Admiral Penn was of great value to his son and enabled him to protect the Quakers from persecution, and to obtain the grant of the province of Pennsylvania. The admiral had lent to the Crown various sums of money, and these with his arrears of pay amounted to over £12,000. Afterwards this debt was liquidated by the grant to the son of the province of Pennsylvania. The admiral intended his son to be a man of fashion and a courtier; but the boy imbibed Whig ideas in politics and Puritanical ideas in religion at Wanstead, where he lived with his mother until his twelfth year, while his father was

## Penn

away at sea. He indulged in athletic sports, studied fairly well, and no doubt his father thought his hopes would be realized. But the Quakers as well as the Puritans were in Oxford, and one day young Penn listened to the preaching of one Thomas Loe. His natural serious-mindedness was touched. He was banished from college, he tells us, because of his new belief, or protests against what he calls 'that hellish darkness and debauchery.' But Penn clung to his new faith and the admiral sent him with some of the gay people of the court to travel in France. He returned, speaking French fluently, and to the great delight of the admiral, very much of a cavalier. But one day he went to Cork on some business, heard his old friend Thomas Loe preach, and this time the doctrine struck home. Penn joined the Quaker faith and remained in it, although he retained many of the habits of the cavalier. He became a controversial writer of great vigor. The Quakers had for many years desired a colony or refuge for themselves in the American wilderness; and in 1680 Penn applied to the crown for a grant of the land north of Maryland. Charles II. was glad enough to establish a distant colony which would rid England of the troublesome Quakers, and he readily gave Penn a charter (March 4, 1681). Penn was the sole proprietor and governor. The Quakers flocked to Penn's colony, which received the name of Pennsylvania, and readily co-operated in establishing a very liberal government. Philadelphia was founded and was soon a thriving town with many inhabitants. Penn became famous throughout the whole world for his fairness in dealing with the Indians and the fidelity with which he kept his promises to them. But his province, though a great success politically and a valuable refuge for the Quakers, never brought in the money returns he expected; on the contrary, it ultimately involved him in debt and financial ruin. James II. was dethroned in 1688, and the Prince of Orange became king of England as William III. Penn was in a dangerous position as the friend of the dethroned and exiled monarch, and was obliged to seek exile for a time in France. The government of Pennsylvania was taken from him. In the reign of Queen Anne he again appeared at court. The financial difficulties

were increasing, and he was imprisoned for debt until released by subscriptions among his friends.

**Pennacook**, an Algonquin Indian word of uncertain meaning, but probably signifying 'a twisted place,' historically applied to an Indian league or confederation occupying the adjacent parts of New Hampshire, Maine, and Massachusetts. During the long period of intercolonial strife between the French and the English the Pennacooks were for a time friendly to the English, but later joined the French. A few of their descendants are supposed to reside near Saint Francis, Quebec.

**Pennant**, or **Pendant**, a long, narrow flag with two pointed ends. Near the staff is the 'union;' beyond this the 'fly' consists of two stripes.



William Penn.

**Pennell, Joseph** (1860-1926), American artist and author, was born in Philadelphia, of Quaker descent. While engaged as a railroad clerk he studied at the Philadelphia art schools in etching and illustrating, and gained a reputation for his etchings of Philadelphia scenes before he was of age. In 1881 he began work as an illustrator for the *Century* magazine. He married Elizabeth (Robins) Pennell (1855), who acted as his literary collaborator in the preparation of numerous illustrated books of travel and description. Together they prepared *Modern Illustration* (1895) and *Lithography and Lithographers* (1898), and in 1906 a *Life of James McNeill Whistler*, done at his request. Mrs. Pennell also assisted in the preparation of *Pen Draw-*

*ing and Pen Draughtsmen* (1889), an important work descriptive of the art at the time of the books' publication. After 1884 Pennell resided chiefly in London, where he occasionally gave lectures at the art schools. He wrote *Etchers and Etching* (1919) and was editor (with wife) of *Whistler Journal* (1921). See E. Pennell's *Life and Letters of Joseph Pennell* (2 vols. 1929).

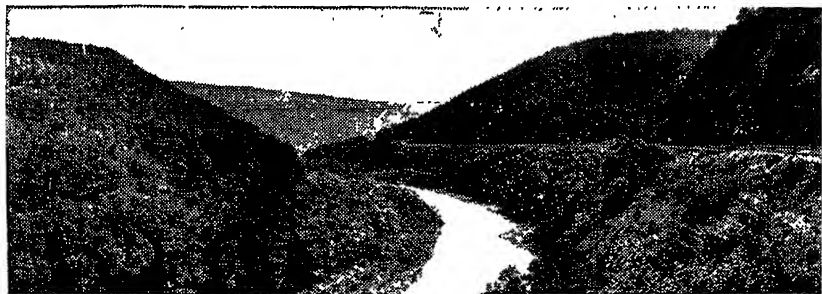
**Pennine Alps** extend from Little St. Bernard to Simplon Pass. But usually the western portion (Little St. Bernard to Col. Ferret) is termed the chain of Mont Blanc, and the name Pennines applied to the rest only.

**Pennsylvania** (named after William Penn's father; popularly called the 'Keystone State'). One of the North Atlantic States, being one of the Middle States. The Delaware River marks its entire eastern boundary line, and its southern boundary is known as 'Mason and Dixon's line.' The surface of the State is divided into three natural sections by ranges of the Appalachian Mountains. The s.e. corner lies in the Coastal Plain and Piedmont regions, and is generally level; but it is diversified toward the north and west by beautiful rounded hills, interspersed with broad, fertile valleys. The Blue Mountains are a continuation of the Kittatinny range of Northwestern New Jersey and the Shawangunk Mountains of New York. The break in the mountains admitting the passage of the Delaware River is known as the Delaware Water Gap. The elevated region between the two main ranges is known as the Alleghany Plateau. The general elevation of the Blue Mountains is somewhat less than 2,000 feet, while no peak of this range attains to as much as 2,400 feet. That portion of the State to the north and west of the mountain ranges is a broad plateau or table land, occupying about one-half of the total area, and having a rolling surface, broken here and there by low, flat-topped hills.

The drainage of the State is comprised in three main basins—the Delaware, the Susquehanna, and the Ohio. The Delaware flows along the entire eastern boundary, receiving as tributaries the Lackawanna, the Lehigh, and the Schuylkill. The Susquehanna crosses the State from north to south, making its devious way among the numerous mountain ranges and flowing into Chesapeake Bay. The climate varies considerably in different parts of the State. The mean temperature of Philadelphia is 32° F. for January and 76° for July, with extremes of -6° and 103°. At

Pittsburgh the mean for January is 30°, for July 74°, and the extremes are -20° and 103°. The winters are long and colder north and west of the mountains. The mean annual precipitation of 39.8 inches at Philadelphia, 36.7 inches at Pittsburgh, and 41.3 inches at Erie. The snowfall on the western plateau is heavy. The soils are generally fertile, being composed either of alluvial deposits or of eroded limestone. Some of the valleys, notably the beautiful Wyoming and the picturesque Lebanon, are remarkably fertile, the soil being peculiarly suited to grain growing. To the west of the Susquehanna, in the southern part of the State, is the Cumberland Valley, also noted for its fertility. The most re-

550,741 tons, (the peak years), while that for 1940 was 125,000,000 tons. This coal is mined in the western part of the State, and covers an area of 12,200 sq. m. Pennsylvania produces about 33 per cent. of the annual output of coke in the United States. In 1859 petroleum was discovered in the submerged basal Carboniferous strata of Northwest Pennsylvania. The output increased at a remarkable rate. The output in 1929 was 11,820,000 bbls., which was the highest recorded since 1902. In 1939 the production was 17,337,000 bbls. The natural gas region includes nearly all the Alleghany plateau. Pennsylvania ranks very high in the total value of the product of its stone quarries. Especially



*Pack Saddle, Conemaugh Valley, Pennsylvania.*

cent formations in Pennsylvania are the Cretaceous and Triassic along the Delaware River, covering most of the Bucks and parts of Lehigh and Montgomery counties. The remainder of the State belongs to the Azoic and Palaeozoic periods.

Pennsylvania is a leading State in the annual value of its mineral products. By far the most valuable and most abundant resource is coal. From 1830 to 1880 Pennsylvania produced two-thirds of the annual tonnage of coal mined in the United States. Anthracite coal was discovered at the mouth of Mill Creek, on the Susquehanna, in 1762. Since 1870 anthracite has been mined regularly. This coal is obtained in four narrow fields, having a total area of only 484 sq. m.—the Northern of Wyoming, the Eastern Middle, or Lehigh, the Middle—the last two being sometimes combined as the Schuylkill. The Pennsylvania fields represent practically the entire supply of anthracite in the United States. Scranton is the largest hard coal center of the country and makes much steel. The mining of bituminous coal began prior to 1790. By 1918 the total production was 178,-

important are limestone, basalt, graphite, slate, sand and clay. Iron ore occurs in commercial quantities in every county of the State. Previous to 1850 the production was sufficient to supply the iron and steel mills of the State, but the discovery that rich ore could be obtained from the Lake Superior region at less cost resulted in a decreased output. Pennsylvania has large areas of limestone rock suitable for making cement, and Northampton and Lehigh counties are centers of the cement industry. Copper, feldspar, gold recovered from pyritiferous magnetite, mineral paints, peat, silica, talc, tripoli, silver, and mineral waters are also produced.

Pennsylvania has always been of importance in the lumber industry. The principal trees are the hemlock, oak, chestnut, maple, beech, white pine, birch, yellow poplar, hickory and larch. According to the Federal Census for 1930, there were 172,419 farms in the State, comprising an area of 15,309,485 acres. Market gardening is important in the southeastern part of the State. Tobacco is raised chiefly in Lancaster and York counties. The

principal orchard fruits are apples, peaches and pears. From the colonial period until the present time Pennsylvania has been among the leading States in manufactures, and now is second only to New York. Pennsylvania is favored by its unique geographical position, being the only State touching the Atlantic seaboard and the Great Lakes, and having direct connection by river navigation with the great Southwest. Some of the materials used in manufacture, such as petroleum, natural gas, bituminous coal, anthracite coal, iron ore, limestone, clay, glass sand, timber and tobacco are produced in large quantities. Pennsylvania has always ranked first among the States in the production of iron and steel. The first blast furnace began operations in 1790 in Fayette co. Following the opening of the Sault Ste. Marie Canal in 1855, Lake Superior iron ore was used in increasing quantities. The great centers now are Allegheny co. (Pittsburgh, Homestead, Braddock, McKeesport) and in Newcastle, Bethlehem and Johnstown. The combined iron and steel industries, including steel works and rolling mills, blast furnaces, and the manufacture of tin plate, rank far ahead of all other industries in the State. Second in importance is the textile group of industries, including the manufacture of woolen, worsted, cotton, silk and rayon goods, knit goods, carpets and rugs, cordage and twine.

Allied to the iron and steel industries are the products of foundries and machine shops—a classification covering products of great diversity. Other industries of Pennsylvania include electrical machinery, apparatus, and supplies; petroleum refining; steam railroad car construction and repairs, printing and publishing; including newspapers and periodicals; book and job; music; bread and other bakery products, wholesale meat packing, coke, not including gashouse coke, cigars and cigarettes; motor vehicles, bodies and parts; clay products. Philadelphia is the largest and most important city in the State. The leading industries in the Philadelphia area are petroleum refining, knit goods, electrical machinery, printing and publishing, foundry and machine shop products. Pittsburgh, called 'The City of Steel,' is the second city in the State in value of manufactured products. The leading industries are those which use ore and metal as the principal materials. Johnstown, Allentown, Reading and Erie are also important. Philadelphia is the principal port of entry for foreign commerce. Pittsburgh is an

interior port. Erie is prominent in internal commerce, especially in the shipment of iron ore, soft coal and grain. According to the Federal Census for 1940, the population of Pennsylvania was 9,900,180. Of this total, foreign-born whites numbered 1,250,000. The urban population, in towns and cities of at least 2,500 inhabitants, comprises 66.5 per cent. of the total.

Pennsylvania has a State Council of Education which regulates the chartering of colleges, and has general administrative control of the public school system; a State Superintendent of Public Instruction, appointed by the governor and senate for four years, having general supervision of public schools; a county superintendent in each county chosen by the school directors in each district who are elected for four years. Institutions for higher education in the State include: University of Pennsylvania at Philadelphia, Bryn Mawr College, for women at Bryn Mawr; University of Pittsburgh at Pittsburgh; Lehigh University at Bethlehem; Lafayette College at Easton; Washington and Jefferson College at Washington; Muhlenburg College at Allentown; Temple University at Philadelphia; Lebanon Valley College at Annville; Carnegie Institute at Pittsburgh; Drexel Institute at Philadelphia; Duquesne University, at Pittsburgh; Geneva College, at Beaver Falls; Irving College, at Mechanicsburg; Juanita College, at Huntingdon; Ursinus College, at Collegeville; Albright College, at Myerstown; Wilson College, at Chambersburg; Villa Nova College (R. C.), at Villa Nova; Dickinson College, at Carlisle; Gettysburg College at Gettysburg; Haverford College, at Haverford; Grove City College; Franklin and Marshall College at Lancaster; Bucknell University, at Lewisburg; Allegheny College, at Meadville; Susquehanna University, at Selingsgrove; Westminster College, at New Wilmington; Swarthmore College, at Swarthmore; Pennsylvania College for Women at Pittsburgh; and the publicly controlled Pennsylvania State College, at State College, and Pennsylvania State Forest School, at Mont Alto. Girard College, a school for orphan boys at Philadelphia, is one of the most richly endowed institutions in the United States.

The charitable and penal institutions of Pennsylvania are under the control of the Department of Public Welfare created in 1921, and consisting of four bureaus directed by the Secretary of Public Welfare. There

are State medical and surgical hospitals in the coal mining districts. Industrial work in the penitentiaries and reformatories is an important activity of the Bureau of Restoration. The products of these institutions are numerous, including brushes, shoes, sheeting, and furniture. The present constitution of Pennsylvania was adopted in 1873. The legislature consists of a Senate, one-half of which is chosen every two years, and a House of Representatives chosen biennially. Regular sessions convene in January of odd years. The chief executive officers are the Governor, Lieutenant-Governor, and a Secretary of State, all elected for a term of four years; an Auditor-General, elected for three years; a Treasurer, elected for four years; and an Attorney-General, appointed by the governor (with the approval of two-thirds of the Senate) during pleasure. The Superintendent of Public Instruction is similarly appointed for a term of four years. The governor is not eligible for the next succeeding term. The judicial authority is vested in a Supreme Court of seven justices, elected at large for a term of twenty-one years, and ineligible for re-election; in a Superior Court of seven judges elected also at large for ten years; in Courts of Common Pleas, for which one judge is elected for a term of ten years, in each of the judicial districts of one or more counties, holding sessions in each county of the district; and in Justices of the Peace. Under the Reapportionment Act Pennsylvania has 33 Representatives in the National Congress. Harrisburg is the capital of the State.

In 1638 the Swedes under Peter Minuit settled along the Delaware and founded New Sweden, but in 1655 they were conquered by the Dutch of New Netherland. In 1664 these settlements on the Delaware were granted to the Duke of York, together with all the lands between the Delaware and the Connecticut. The Duke of York, in turn, granted the region to William Penn, a zealous Quaker. In 1680 Penn received a grant of the region forming the present State of Pennsylvania. He was made absolute lord of all the lands, paying to the crown a fixed rent of two beaver skins. Penn sent over William Markham as deputy until he came himself. Philadelphia was laid out in 1682. Penn arrived in the colony in the fall of 1682, and immediately concluded a treaty with the Indians. He submitted several schemes of government before one was firmly established. The

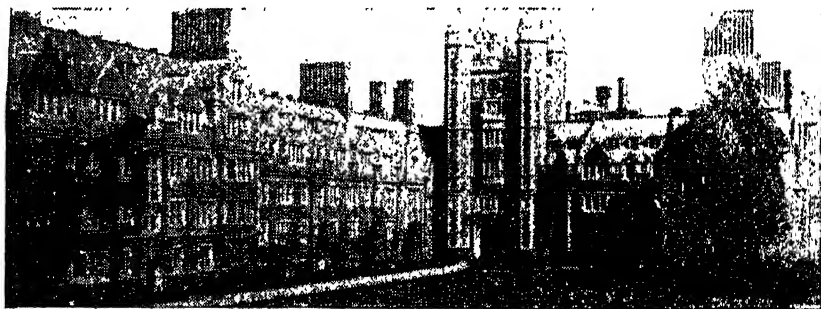
constitution as revised in 1701 was in force until the Revolution. Liberty of conscience was granted to all who acknowledged God. In 1682 Penn received from the Duke of York the right to the soil of the three lower counties on the Delaware, and with the consent of the inhabitants assumed the government of these counties. They remained a part of Pennsylvania though with a separate legislature after 1703, until they formed the State of Delaware in 1776. Pennsylvania had long disputes over its boundaries on every side. Penn accepted 42° as the northern boundary, and insisted on 39° as the southern. It was not until 1760 that the line was settled, on a compromise made in 1732, being fixed at the parallel of 39° 43'. The line was surveyed for 264 miles by Mason and Dixon in 1763-7. In the west there were disputes with Virginia and Connecticut. The boundary with Virginia was settled in 1779 by extending Mason and Dixon's line to a point five degrees w. of the Delaware River.

The dispute with Connecticut was more serious. The 'Pennamite and Yankee War' was fought over the possession of the Wyoming Valley. Finally the Continental Congress interfered, by virtue of the Articles of Confederation, and for State reasons gave the disputed tract to Pennsylvania. In 1792, by act of Congress, Pennsylvania obtained the triangular strip west of New York and north of the parallel of 42°, on Lake Erie, thus securing a lake frontage. Soon after the adoption of the Declaration of Independence, which was signed at Philadelphia, a State government was organized (1776). During the greater part of the war Pennsylvania served as a base of operations for Washington. Except for the brief period that it was held by Howe (1777-8), Philadelphia was the seat of Congress. During the first few years of the Union the large foreign population in Western Pennsylvania caused trouble for the Federal Government, through their ignorance of the true nature of the new conditions. The Scotch-Irish resisted the excise tax on liquors, which led to the Whiskey Insurrection of 1794. In 1798 the Germans resisted the assessment of a direct tax, and this resulted in Fries' Rebellion. About 1820 the State began a series of internal developments, and built many miles of roads, canals, and railroads. At the outbreak of the Civil War, Pennsylvania was the first to respond to Lincoln's call to arms, and at once sent troops to defend the National Capital. During the

war it was invaded by the Confederates in 1863 and 1864. At Gettysburg, on July 1-3, 1863, one of the decisive battles of the war was fought. Since the Civil War Pennsylvania has had a remarkable industrial growth, especially in the coal, oil, and steel industries. In 1876 the Centennial Exhibition, the first international exposition in the United States, was held in Philadelphia, and was attended by more than 8,000,000 people. In 1889 occurred the flood at Johnstown, in which 2,000 persons lost their lives. In 1897 the State capitol at Harrisburg was burned, causing a loss of \$1,500,000. Following this a new capitol costing upward of \$13,000,000 was erected. Republican for many years. Penn-

sylvania, and reorganized in 1874 under its present title, with greatly enlarged scope. Its grounds of over 2,000 acres are occupied by a campus of 100 acres, 9 model farms, 140 acres for the use of the Experiment Station, and 100 acres for orchard experiments of the Department of Horticulture. There are Schools of Agriculture, Chemistry and Physics, Education, Engineering, Liberal Arts, Mineral Industries, Physical Education and a Graduate School, a summer session for teachers, correspondence and extension courses, and the Institute of Animal Nutrition (1907). Military drill is required in the first two years. See UNIVERSITY.

**Pennsylvania, University of**, an unde-



*University of Pennsylvania: Provost's Tower and dormitories.*

sylvania went Democratic in 1934 and 1936; and Republican in 1938.

**Pennsylvania Dutch**, or **Pennsylvania German**, a High German dialect, spoken chiefly in the southeastern counties of Pennsylvania. It first entered the United States in 1683, when emigrants from the Lower Rhine, Alsace, Bavaria, and Saxony, and especially from the Rhenish Palatinate, Württemberg, and Switzerland, fled before the armies of Louis XIV., or endeavored to escape persecution on account of certain religious tenets. The language is primarily a Franconian dialect of German, although in the course of time, many English words have been added. The term 'Dutch' is, however, a misnomer, and is due merely to the fact that the immigrants called themselves *Deitsch* (i.e., Deutsch, German). The term 'Pennsylvania Dutch' is commonly applied to the people who speak that dialect.

**Pennsylvania State College**, a non-sectarian institution for both sexes at State College, 12 m. from Bellefonte, Pa.; founded in 1855 as the Farmers' High School, organized in 1862 as the Agricultural College of

nominal institution of higher learning in Philadelphia, founded in 1740 as a charity school, reorganized as an academy in 1749, chartered in 1753 by Thomas and Richard Penn, and again chartered in 1755 as a college through the influence of Benjamin Franklin. A large number of scholarships and fellowships are offered in undergraduate and graduate courses. Graduate courses and degrees are open to women, as are also the courses in Law, Medicine, Dentistry, Education, Biology and Music. The School of Medicine, founded in 1765, was the first in the United States. Among the buildings erected in recent years are: the Laboratory of Anatomy and Biology-Chemistry, the Maloney Clinic Building, additions to the University Library building, additional Dormitory buildings and the Franklin Society Building, for publications and administrative offices. See UNIVERSITY.

**Penny**, an Anglo-Saxon silver coin, thinner and broader than the *seal*, which it supplanted during the middle or end of the eighth century. It superseded Roman and Merovingian coinage. Copper was introduced for

halfpence and farthings in 1672, for pennies in 1786.

**Pennypacker, Samuel Whitaker** (1843-1916), American public official, was born in Phoenixville, Pa. He served with the troops called out to resist the invasion of Pennsylvania in 1863 and in 1902 was elected governor of Pennsylvania.

**Pennyroyal** (*Mentha pulegium*), the popular name of a mint common in Europe and Western Asia. The whole plant has a characteristic fragrance.

**Penobscot**, a tribe of American Indians which in early colonial times occupied the territory along the Penobscot River, the largest river in Maine.

**Penobscot Bay**, a bay on the coast of Maine.

**Penology**, that branch of criminology which deals with the punishment of criminals in both its deterrent and reformative aspects. Such punishment undoubtedly had its origin in private vengeance, passing as society developed, under the authority of the state. Because of the almost universal practice of imprisonment as a punishment for crime, the emphasis of modern penology is largely upon prison management. The *honor system*, has been tried in certain State prisons, chiefly in the West. Groups of convicts are sent out to work on the roads or on farms under somewhat relaxed discipline, being put on their honor not to attempt escape. In 1932 about 65 per cent of productive prison labor was under the state-use system. Of the prisoners not at productive labor, 52,986 were engaged in various prison duties; 6,658 were on the sick list; 17,027 were idle. Overcrowding in prisons is a serious problem. Management of prisons is a fairly new science, discussed by Lewis E. Lawes in *Sing Sing*, by Thomas Mott Osborne, and by O. F. Lewis in *Development of American Prisons*. The indeterminate sentence system at Elmira Reformatory, dependent on the individual factors of a case, is an interesting experiment.

Much attention has been attracted by the system of self-government introduced by Thomas Mott Osborne at Auburn and Sing Sing Prisons, New York State. The prisoners are organized in a Mutual Welfare League, in which membership is open to all. The League is in almost complete control of the discipline, and the prisoners enjoy large privileges as to correspondence, freedom to see visitors, recreation, etc. The past century has witnessed a remarkable advance in the general matter of the punishment of criminal of-

fenders. Riots, however, and disorder show that not all the problems have been solved. See PRISONS. The State Medium Security Prison at Wallkill, N. Y. is designed to be an educational factor. It is a new experiment in criminal rehabilitation, one of the present problems of penology being to fit inmates for gainful employment. Professional penologists now seem opposed to isolated prisons. The Georgia penal system, the chain gang, has met much criticism also, although it is ably defended.

The psychiatrist is taking a leading place in modern penology. The factors, individual and social, which make for the prevention of crime are now considered more the subject of research than are the penalties inflicted.

In recent years penologists have advocated the separation of youthful and first offenders from the hardened criminals, and some progress has been made along these lines. The Federal government has built a prison on Alcatraz rock in San Francisco Bay for dangerous and incorrigible criminals. The building on the huge rock, which is surrounded by the swiftly running waters of the Golden Gate, is believed to be absolutely escape-proof and the prisoners are permitted few of the privileges common to the average penological institution.

**Penrose, Boies** (1860-1921), American legislator and political leader. In 1897 he was elected United States Senator, and was re-elected in 1903, 1909, and 1915. He served as chairman and member of important committees in the national Senate and became the leader of the Republican Party in that body. For more than two decades, Penrose was master of the Pennsylvania Republican machine when that machine ruled the state. He became chairman of the powerful Finance Committee of the U. S. Senate and was credited with guiding the choice of Warren G. Harding as Republican Presidential nominee from his sickbed in 1920. He was an important factor in Republican Presidential campaigns from 1896 until his death. Penrose was supposed to have joined with Senator Thomas Platt of New York in nominating Theodore Roosevelt for the Vice-Presidency in 1900 in an effort to get Roosevelt out of Platt's way in New York State politics. "Power and Glory," a life of Penrose by Walter Penrose, was published in 1931.

**Pensacola**, city, Florida, county seat of Escambia co., on Pensacola Bay. It has a splendid land-locked harbor. Features of interest are the old historic forts. At the old



Navy Yard is now located the Pensacola Naval Air Station. The historic Plaza Ferdinand, where the transfer of Florida took place, is the civic center of the city. Pensacola has an extensive foreign trade, the chief items of shipment being cotton, lumber, naval stores, hides, fertilizers, and iron and steel articles. Founded in 1559 by the Spaniards under Luna, it fell before the French arms in 1719 and by the Treaty of Paris (1763) passed with West Florida into the hands of the French. In 1783 the territory was restored to Spain by treaty. Although the United States claimed Pensacola by the Louisiana Purchase of 1803, Spain consented to its occupation by the English in the War of 1812. It was taken by General Jackson in 1814, and again in 1818, and was formally ceded by Spain the following year; p. 37,449.

**Pensacola Bay**, an inlet of the Gulf of Mexico on the west coast of Florida. It affords an excellent harbor.

**Pensions**, pecuniary allowances payable at regularly recurring periods, usually in recognition of past services. The first national pension law was enacted by the Continental Congress on Aug. 26, 1776, giving half pay for life to any officer, soldier, or sailor who had lost a limb in an engagement, or had been otherwise incapacitated for earning a living. The principle of pension for service, without regard to disabilities incurred in line of duty, was introduced in 1818. By act of July 4, 1836, widows of Revolutionary soldiers were pensioned. Pensions for the regular military establishment were first granted in 1790, but the fundamental law for regular army pensions up to 1886 was that of 1802, which declared that officers and privates disabled by wounds or otherwise while in the line of duty should be placed on the pension list. In 1802, also, a grant of half pay was made to the widows or children of commissioned officers dying in consequence of wounds. The first important legislation relating to Civil War pensions was the act of July 14, 1862, by which pensions ranging from \$8 to \$30 per month were granted for disabilities arising from service in the Union Army or Navy after March 4, 1861. The law of July 4, 1864, introduced the principle of fixed rates for specific disabilities. In 1866 the provisions of the act of 1862 and supplementary acts were extended to all pensions granted under previous acts except Revolutionary pensions.

Since the close of the Civil War the tendency of pension legislation has been in the direction of even greater liberality. According to the National Defence Act of 1916, officers and enlisted men of the National Guard drafted into the service of the United States in time of war are entitled to all the benefits of the pension laws existing at the time of their service. Further provision was made for soldiers and sailors in the Great War in the War Risk Insurance Act of Oct. 6, 1917 designed to do away with the evils of the pension system. World War compensations were handled along with insurance and disability compensation by the Veterans' Bureau. A system of loans to Veterans on Adjusted Service Certificates was arranged. Payments differ from pensions in not being paid at stated intervals. They were not, however, loans; as they did not have to be paid back. In 1931, over President Hoover's veto, the amount of loan obtainable was increased to 50 per cent of the face value of the Certificates instead of 25 per cent as in 1924. The time limit for making application for a certificate was extended to Jan. 2, 1935. These payments are in effect cash bonuses, dispensed at will of Congress before maturity of the certificate—which was previously given in the form of a 20-year insurance policy. See Bonus.

In 1930 a pension bill was passed in which the rates stand at \$12 a month minimum and \$40 a month maximum. Veterans will be deprived of compensation for diseases due to their wilful misconduct. Veterans of sufficient means to pay an income tax are excluded from the benefits of the act. In addition to pensions granted under the general laws, a large number of claimants rejected by the regularly constituted authorities have been pensioned by special act of Congress. Spanish War veterans come under the general measures applicable to soldiers of the Civil War. In 1930 a bill which increased the compensation of Spanish-American War veterans by \$11,000,000 was passed over the veto of President Hoover. By executive order of July 21, 1930 the Veterans' Bureau, Bureau of Pensions and the National Home for Disabled Volunteer Soldiers were consolidated. The combined organization is the Veterans' Administration. The total disbursements to June 30, 1940, exclusive of the amount disbursed under Civil Service and Canal Zone Retirement acts, was \$23,999,1282,000. The largest items are Army and

Navy pensions from 1790 to 1940: \$14,131,846,000. The number of veterans receiving compensation was 610,122; deceased veterans' beneficiaries, 239,176. The pensions paid in 1940 were: Civil War, \$27,790,000; War with Spain, \$127,427,000; World War, \$254,846,000; other wars, \$19,075,000. 608,923 service and ex-service men and women were carrying government Life Insurance. There were 3,792,432 Service Certificates with total indebtedness outstanding of \$3,709,945,000.

In the Seventy-second Congress, of January to March 1932, the appropriation bill of \$1,000,000,000, of which \$560,000,000 was for costs of the Veterans' Administration, was vetoed by President Hoover, who recommended a curtailment of \$127,000,000 in payments to Veterans on disabilities not traceable to service in war. In the Seventy-third Congress, meeting in March 1932, the Economy Act was passed. This act reduced the pensions of veterans of wars previous to 1917 10 per cent; maximum and minimum rates were provided for disabilities in wars subsequent to the Civil War; no reduction was to be more than 25 per cent. The President was authorized within these limits to set pension rates to be paid. One of the chief effects was to separate from the roll some 328,000 men who could not show service connection for disabilities. In 1936 the Adjusted Compensation Act was enacted, which made veterans' World War adjusted compensation certificates immediately payable, in \$50 U. S. bonds, bearing interest at 3 per cent unless cashed within one year, dated June 15, 1936, to mature June 15, 1945, redeemable in cash at any time. This action taken by Congress over the President's veto, cost the government about 27 per cent more than payment in 1945 would have cost. Most of the bonds were cashed within a year. In the 1939 conventions of veterans' groups efforts were blocked to start movements for World War pensions. See OLD AGE PENSIONS; LABOR LEGISLATION; UNITED STATES, NEW DEAL.

Many industrial pension and insurance plans in the United States are entirely at the expense of the employers, though in an increasing number of plants some contribution from the employee is required. The contribution is usually returned if the employee leaves the company. See EMPLOYERS' LIABILITY.

**Pentagon**, a geometrical figure of five sides. A regular *pentagon* is one having both sides and angles equal. When a pentagon takes the

form of a star, it is called a pentacle or pentagram. The name pentagon is also applied to a fort with five bastions.

**Pentateuch**, a Greek word (*pentateuchos*) meaning 'the five-volumed (book),' is the name used by Origen to denote what the Jews of his time called 'the law' (*Torah*).

**Pentathlon**, or **Pentathlum**, one of the regular contests in the Greek games. Its victor was the man who gained the greatest success in five different events—leaping, foot running, throwing the quoit, casting the javelin, and wrestling.

**Pentecost**, a Jewish festival observed fifty days after the offering of the wave sheaf on the second day of unleavened bread (Passover), and intended to indicate the end of the harvest. The later Jews associated the feast with the deliverance of the law at Sinai, believed to have taken place fifty days after the Exodus from Egypt. The festival has passed into the Christian Church as commemorative of the descent of the Holy Spirit. Pentecost is one of the great festivals of the Christian year, and it was chosen as one of the times for the administration of baptism. The English name *Whit Sunday* is derived from the white robes in which the newly baptized were clad.

**Pentelicus**, mountain range (3,640 ft.) in Attica, 10 m. n.e. of Athens. Its marble which was much quarried in ancient times is still in great demand at the present day. It is of a brilliant white color, with a yellowish tinge and it was employed for the Parthenon and other public buildings in Athens.

**Pentland Hills**, mountain range, Scotland, running s.w. through the counties of Edinburgh, Peebles, and Lanark. The highest summit is Scald Law (1,898 ft.).

**Penumbra**, in astronomy, means the partial shadow between the umbra, or region of total eclipse, and the region of entire freedom from eclipse.

**Penza**, province, Soviet Republic of Russia, a rolling plain, cut by deep river valleys, and rising highest toward the s. and s.w., where lies the watershed between the Don and the Volga. The climate is severe. Cattle breeding is an important industry. The non-Russian population is composed of Mordvins, Meshcheriaks, and Tartars. Trade centers are Penza, a fine city in its modern part, and the capital; Nijni-Lomov, Mokshani, and Saransk; p. 2,207,000.

**Penzance**, seaport town, England, in Cornwall, on Mount's Bay, nearly opposite St. Michael's Mount. It enjoys a mild climate,

and is a winter invalid and summer bathing resort; p. 12,087.

**Peonage**, a term loosely used to denote the system of labor formerly prevalent in Mexico and other parts of Spanish America. Eventually, through the aggressions of the upper classes, the laborer was reduced to a state resembling serfdom.

**Peony** (*Paeonia*), a genus of perennial herbaceous plants and shrubs belonging to the order Ranunculaceæ. They generally bear large showy flowers, some double, and some recent garden hybrids being of great beauty. They like deeply dug, somewhat rich soil, and plenty of space.

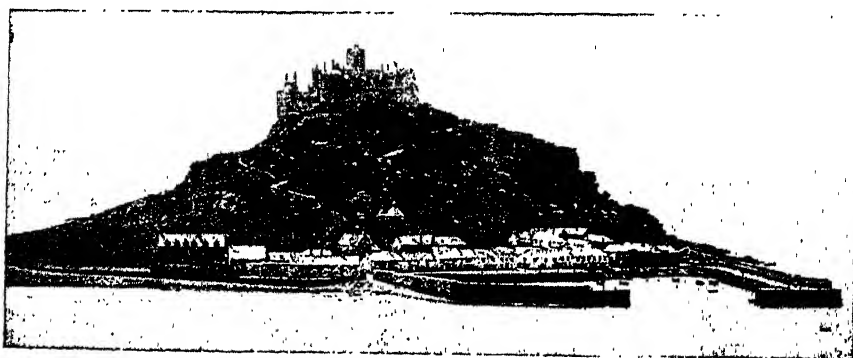
**People's Party**, the official designation of an American political party now commonly called the Populist Party. It was organized

site on a broad plateau, 40 ft. above the river, which widens above into the expanse known as Peoria Lake. Rolling prairies surround the city.

Peoria is an important manufacturing center. Products include: tractors, lawn sprinklers, washing machines, commercial solvents, food products, whiskies, clothing, agricultural implements, oil burners, watches, barrels, paper, candies, cereals, steel and wire fence, beef and pork goods; p. 105,087. There is a livestock market and, nearby, a rich coal area. The city is the seat of Bradley Polytechnic Institute.

**Pepin**, or **Pippin**, the name of several Carolingian rulers.

**Pepper**, or **Piper**, a genus of plants, chiefly tropical, belonging to the order Piperaceæ. The



*St. Michael's Mount, Penzance.*

in 1891 to represent the interests of farmers and workingmen. The platform of the party demanded free coinage of silver; the issue of paper money to be loaned directly to farmers on the security of agricultural crops; the abolition of national banks; government ownership of railways; telegraphs and telephones; a graduated income tax; and the prohibition of alien ownership of land. At the National Convention of the People's Party in 1892 the above-mentioned principles were embodied in the platform, and James B. Weaver of Iowa was nominated for President. In 1896, the Democratic Party having adopted many of the principles advocated by the People's Party, the latter organization endorsed the candidacy of W. J. Bryan, but nominated a candidate of its own, Thomas E. Watson, for the vice-presidency. In the end the party lost the greater part of its following through absorption into the radical wing of the Democratic party.

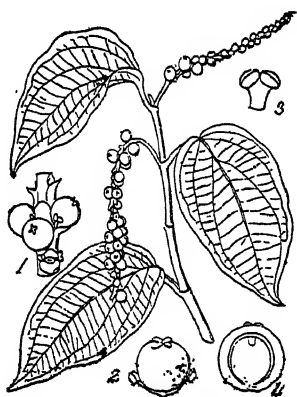
**Peoria**, city, Illinois, occupies a beautiful

most important species is *P. nigrum*, from which is obtained the black and white pepper of commerce. The berries are bright scarlet when ripe; the dried berries, collected before maturity, black and wrinkled, constitute black pepper. White pepper is obtained by removing the outer skin of the ripe fruit. Red or Cayenne pepper comes from *Capsicum*, a native of the New World.

**Pepper**, **George Wharton** (1867- ), American lawyer and public official, was born in Philadelphia, graduated from the University of Pennsylvania, and practised law in Philadelphia where he was active in political, financial and civic circles. In 1915 he delivered the Lyman Beecher lecture at Yale College. In 1922 he was appointed United States Senator to fill the vacancy caused by the death of Boies Penrose, and was subsequently elected for the term ending in 1927. Among his writings are *Men and Issues* (1924); *In the Senate* (1930); *Family Quarrels* (1931).

**Pepper**, **William** (1843-98), American

physician, was born in Philadelphia. He was professor of clinical medicine in the University of Pennsylvania in 1874-84, professor of the theory and practice of medicine in 1884-98, and provost of the university in 1881-94. He took a prominent part in establishing the University of Pennsylvania Hospital and was also one of the founders of the American Society for the Extension of University Teaching, and the Pennsylvania Museum and School of In-



Pepper.

1, Part of catkin; 2, flower; 3, stamen; 4, vertical section of fruit.

dustrial Art. He founded the *Philadelphia Medical Times*, and edited it in 1870-1. In conjunction with John F. Meigs he edited a *System of Medicine by American Authors* (5 vols., 1885-86). He was author of *Trephining in Cerebral Disease* (1871); *Theory and Practice of Medicine* (1893); etc.

**Pepperell, Sir William** (1696-1759), American colonial soldier, born in Kittery, Me. When King George's War broke out in 1744, Pepperell was very active in raising troops and was asked to take command of the colonial expedition against the strong fortress of Louisbourg on Cape Breton Island. He landed before Louisbourg late in April, 1745, and, being supported by a British fleet under Commodore Warren, succeeded by June 17 in forcing the place to capitulate. When Pepperell returned to New England in 1746 he was highly honored, was created a baronet by King George II. When the French and Indian War broke out, he was created a major-general, and was put in command of the defenses of the borders of New England. He was acting governor of Massachusetts during 1756-1758, was pro-

moted to be a lieutenant-general in 1759, and died in the same year.

**Peppermint** (*Mentha Piperita*), a herbaceous European plant with a creeping root, a smooth stem, stalked ovate leaves, and lax spikes of labiate flowers. The whole plant yields a marked aromatic odor. An essential oil is distilled from the fresh flowering tops, cut in August and dried on the ground before being distilled. Preparations of this oil are used in medicine as stimulants and carminatives.

**Peppergrass**, a name given to members of the genus *Lepidium*, a division of the order Cruciferae. The only member of the genus of any importance is *L. sativum*, the common garden cress.

**Pepsin**, an enzyme secreted by glands in the gastric mucous membrane; it has the power, when in acid solution, of converting proteids into soluble peptones.

**Peptones** are the soluble primary products formed in digestion by the breaking down of proteid food substances through the action of the pancreatic and gastric ferments.

**Pepys, Samuel** (1633-1703), English diarist, was born probably in London. In 1659 he entered official employ, and began his *Diary*. This, for the next ten years, forms a minute record of his official and personal interests, of his amours and his disputes with his wife, and of the habits and scandals of London. In 1673 he was appointed secretary for the affairs of the navy, and in the same year entered Parliament as member for Castle Rising. In 1684 he was again appointed secretary to the Admiralty, and was also president of the Royal Society. In 1690 he published his *Memoirs of the Navy*. He left his library to Magdalene College, Cambridge, and there his *Diary* remained until it was deciphered by J. Smith and published in 1825.

**Pequot**, a former Algonquin tribe of s.e. Connecticut. They were practically one tribe with the Mohegans before the English settlement, but about that time a party under Uncas seceded, retaining the name Mohegan. The Pequots numbered at least 3,000.

**Perak**, British protected state, Malay Peninsula, with Strait of Malacca on w. Area, about 8,000 sq. m. Perak is traversed by two chains of mountains (7,000 ft.), and is well watered, the chief river being the Perak. Taiping, or Taiping, is the chief town; Port Weld is the seaport; p. 600,000. Exports include tin, sugar, indigo, cocoanuts, tanning barks, and rattans.

**Per Capita, Per Stirpes**. These terms

mean literally according to heads, according to stock. They are expressions in frequent use in statutes of distribution of property in case of intestacy. When property descends per capita it goes in equal shares to those of equal degree of kinship to the common ancestor. When, however, the surviving kindred are of different degrees of relationship it descends per stirpes—as, for instance, if a man dies leaving two sons and three grandchildren, the children of a deceased son, the two surviving sons take each one-third, the grandchildren a one third divided between them. See DISTRIBUTION, STATUTES OF; INHERITANCE.

**Perception**, as a technical term of psychology, means the direct apprehension of objects in space. Perception is thus contrasted with the processes of memory and conceptual thinking, which are later developed and obviously presuppose perception, and mere sensation; there is no perception in the strict sense of the term where there is no apprehension of an object.

**Perceval, Sir**, a knight of King Arthur's court, hero of a group of tales originally independent of the Arthurian tradition. He becomes, by the discipline of experience, a wise and valiant knight, and eventually king of the mysterious Grail Castle.

**Perch**, a common 'spiny-finned' fresh-water fish, represented throughout most of the northern hemisphere. The most typical and best known are the 'yellow' perches of Europe, Asia and North America, which are substantially alike, and are favorites with anglers and excellent to eat. The name of perch is given to various other fishes, both fluviatile and marine, which have only a more or less distant relationship to the true perches.

**Perchloric Acid**,  $\text{HClO}_4$  is prepared by distilling potassium perchlorate with concentrated sulphuric acid. It is a fuming, volatile, colorless liquid, which dissolves in water with evolution of heat, and is a violent oxidizing agent, usually acting explosively.

**Percussion**, a means of medical examination, which depends on the varying resonance of the different organs and tissues of the body. When a sharp tap is made with the fingers over air-containing organs such as the lungs, the note elicited is resonant and clear, unlike that produced by a blow over a solid organ such as the liver.

**Percussion Caps** are small, hat-shaped cups made from sheet copper. To the interior adheres detonating powder.

**Percy**, a family in the n. of England. William de Percy (?1030-96), the founder, came

over with William the Conqueror, and received lands in Lincolnshire, Yorkshire, and Hampshire. At the coronation of Richard II. (1377) the fourth Lord Percy of Alnwick, then marshal of England, was created Earl of Northumberland. See NORTHUMBERLAND, DUKES OF.

**Percy, George** (1580-1632), American colonial governor. He served for a time in the Low Countries, and in 1606 sailed with the first expedition to Virginia. He was governor of that colony, after the departure of John Smith, in September, 1609, till the arrival of Gates in May, 1610—the period of the terrible 'starving time'—and when Lord de la Warr left in March, 1611, he again held the same position until the arrival of Dale in the following May. He returned to England in 1612, and again fought in the Low Countries, where he distinguished himself.

**Percy, Thomas** (1729-1811), bishop of Dromore, was born in Bridgnorth, Shropshire. He published *Miscellaneous Pieces relating to the Chinese* (1762), and *Five Pieces of Runic Poetry* (1763). The *Reliques of Ancient English Poetry* was published (1765), and by renewing interest in the older poetry marked an epoch in English literature.

**Pereda, José Maria de** (1833-1906), Spanish novelist, a strong and virile portrayal of the humors and foibles of his countrymen, was born at Polanco. His most brilliant works are *Escenas Montañesas* (1870), *El Sabor de la Tierra* (1882), *Peñas Arriba* (1895), and *Sotileza* (1885). Of another style, but not less brilliant, is *Don Gonzalo Gonzales de la Gonzalera*, a socio-political satire. As a descriptive writer of nervous prose Pereda has no equal in Spain.

**Perennials**, a term applied to plants that live for several years, as distinguished from annuals and biennials, whose life is only of one and two years respectively.

**Perfectionism**, or **Perfectibility**, the doctrine that a perfect Christian life is attainable in this life.

**Perfectionists**. See COMMUNISM.

**Perfumery** deals with the preparation and properties of those fragrant-smelling substances used for toilet purposes, or in industries such as the soap trade. The art of perfumery consists in extracting the odors of plants, the leaves and flower-buds being the chief source of supply. By various means the odors or perfumes of such plants are isolated, and, to render them applicable for use, are absorbed in various materials, such as grease,

fats, oil, spirits, soaps, inodorous inert materials such as starch or talc. The process of extraction is carried out by distillation, by enflourage, by maceration, and by expression.

All the ottos obtained by distillation, enflourage, and maceration are soluble in alcohol, whence is obtained a spirit essence which is in many cases more serviceable than the essential oil. A ready way of producing some kinds of concentrated essence is to dissolve the essential oil in the spirit to form a tincture. Musk, orris root, ambergris, tonka beans, castor, vanilla, civet and a few other odorous substances yield their odors to spirits in this way. The great bulk of the finest quality perfumes are also produced by extracting the fragrance from the enflourage pomades and oils by contact with alcohol. Besides the perfumes extracted from plants, some few are obtained from animal sources—as, for example, musk, civet, ambergris, and castor. With the exception of musk, they are chiefly used for fixing the more volatile perfumes, though in a less concentrated form they are used as a base, the odors of the base being disguised by a judicious blending of other odors. Many perfumes and flavoring essences originally obtained from animal or vegetable sources are now imitated by artificial preparations. These are in general aromatic aldehydes, esters, or ethers, and may be divided into two classes—those which are substantially identical with the naturally occurring substance, and are reproduced as a result of the elucidation of its chemical constitution; and those which may have similar odor and other properties, but are constituted quite differently.

**Perga**, a city in Pamphylia, Asia Minor, about 10 m. from the coast; was celebrated for the worship of Artemis, and was the first town in Asia Minor visited by St. Paul on his missionary journeys.

**Pergamino**, tn., Buenos Ayres, prov., Argentina, an important railway center, 64 m. s.e. of Rosario; p. 39,000.

**Pergamum**, or **Pergamus**. (1) The citadel of Troy, also the city of Troy. (2) A city of Mysia in Asia Minor, on n. bk. of riv. Caicus, about 20 m. from the sea. About 280 B.C. Philetærus established there the kingdom of Pergamum, which was held by seven kings. Pergamum was celebrated for its library, founded by Eumenes II., king from 197 to 159 B.C. The word 'parchment' is derived from *charta Pergamena*, 'paper from Pergamum.' This city was the capital of the Roman province of Asia, and an early seat of Christianity. The modern name is Bergama.

**Pergolesi**, or **Perogolese**, **Giovanni Battista** (1710-36), Italian musical composer, a native of Jesi, near Ancona. After several attempts at opera he produced his masterpiece, *La Serva Padrona* (1731 or 1733). He also composed *Orfeo ed Euridice*, and his famous *Stabat Mater*.

**Peri**, or **Pairika**, is, in Oriental folklore, a being of beneficent nature and having supernatural attributes. A notable example is the Peri Banu of the *Arabian Nights*.

**Perianth**, the outer floral envelope—calyx and corolla—which surrounds and to some extent protects the essential organs of generation in a flower.

**Pericardium**, a fibro-serous sac arranged in two layers, the inner of which is closely adherent to the surface of the heart and to the roots of the great vessels, while the outer is reflected from the vessels and continued downwards to the diaphragm, to part of which its external basal surface is adherent. The space between the outer and inner layers is occupied by the pericardial fluid, which by acting as a lubricant facilitates the cardiac movements. The most important pathological condition of the pericardium is pericarditis.

**Pericarp**, the covering or envelope of fruits. It usually consists of three layers—epicarp, mesocarp, and endocarp.

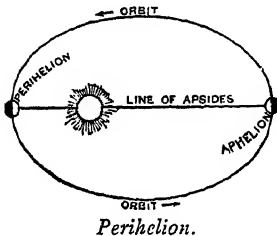
**Pericles** (c. 500-429 B.C.), Athenian statesman, and perhaps the greatest constitutional statesman of antiquity, belonged by birth to the noblest families in Athens. In spite of his noble birth and aristocratic temper, Pericles came forward from the beginning as a democrat, his first appearance in politics being about 469 B.C., as an opponent of Cimon. In domestic politics he introduced the system of payment for the performance of public duties, such as the archonship, and serving in the law courts on juries; as these offices were filled by lot, every citizen had an equal chance of holding political office. In foreign politics his aim was imperial; at one time he seems to have hoped to make Athens head of a confederacy of all the Greeks. He also adorned Athens with magnificent buildings, of which the Parthenon and the Propylæa were the finest. One great factor in his success was his power of oratory; the substance of several of his speeches may be found in Thucydides. In 440 he put down the revolt of Samos, and in 433 he supported the conclusion of an alliance with Corcyra, which led directly to the outbreak of the Peloponnesian War. After his divorce from his wife he lived in a close relationship with the fa-

mous Aspasia. Pericles was a man of the highest principle, integrity, nobility, and dignity.

**Peridotites**, a group of crystalline igneous rocks, of which olivine is an abundant ingredient.

**Périgueux**, chief tn. of French dep. Dordogne. The old town, with many Renaissance houses, contains the remarkable cathedral of St. Front in the Byzantine style (984-1047). Périgueux was the Vesunna of the Romans, and has a large amphitheatre and the circular tower of Vesone, 89 ft. high. It is famous for its *pâtés de foie gras* and truffled partridges; p. 33, 144.

**Perihelion**, the point of its orbit at which a planet or comet makes its nearest approach to the sun.



**Perim**, isl. in Strait of Babel-Mandeb, at s. entrance of Red Sea. It is  $3\frac{1}{2}$  m. long and  $1\frac{1}{4}$  m. wide. The British took possession in 1857. It is a telegraph and coaling-station.

**Perimeter**, in any figure, the sum of the lengths of the bounding lines. See RECTIFICATION.

**Perinæum**, the soft external floor of the pelvis, plays an important part in childbirth, and is frequently ruptured in primiparous patients. In the male the perinæum derives its importance chiefly from the various forms of perineal lithotomy.

**Period and Periodicity**. The most familiar example of a periodic process is the alternation of day and night, brought about by the rotation of the earth upon its axis in presence of the sun. Perhaps the simplest type of periodicity is the oscillation of a pendulum or the vibration of a tuning-fork. Periodicity is one of the most widely spread phenomena in nature. All kinds of wave motion are periodic; and there seems to be little doubt that the molecules of matter are all capable of vibrating in definite periods. In the organic world many of the ordinary vital processes are periodic—such as the pulsations of the heart and the arteries. From the dynamical point of view periodicity means stability, and

instability is associated with motion or tendency to motion which has no periodic character.

**Periodicals**. See **Magazines**.

**Periodic Law**, in chemistry. About 1868 Newlands, Lothar Meyer, and Mendeléeff discovered that if the elements are arranged in the order of their atomic weights, those of similar properties are separated by regular intervals—a fact summarized by Mendeléeff as follows: The properties of the elements are a periodic function of the atomic weight.

**Periosteum**. See **Bone**.

**Periostitis**, inflammation of the periosteum, the tough, fibrous membrane which invests the bones. Its chief causes are a syphilitic taint, rheumatism, and tuberculosis, but its occurrence is often due to injury of the part.

**Peripatetics**, a philosophical school founded by Aristotle. The name is supposedly derived either from Aristotle's custom of walking about (*peripatein*) during the delivery of his lectures, or from the place in which they were delivered. See **ARISTOTLE**.

**Periscope**, an instrument by means of which an observer may view his entire surroundings through a fixed eyepiece. It is of especial value in submarine warfare as by its use observations may be made without coming to the surface, only the top of the instrument projecting above the water. Many modifications exist, but the essential features are the same. They include a heavy steel tube which, when not in use, can be lowered into the hull of the boat; a series of prisms and lenses, and an eyepiece. The rays of light enter the periscope horizontally, are reflected by the first prism into a second prism, from which they pass through an object glass, and thence through a third prism to the eyepiece. The first prism inverts the image, but this effect is counteracted by the second prism. The image is again inverted by the object lens and again restored by the third prism. Other applications of the periscope are to gun sights, and to trench warfare, the field or trench periscope being used behind earthworks and parapets for obtaining, unobserved, a view of the surrounding terrain.

**Perissodactyla**, the odd-toed ungulates, as the horse and rhinoceros, in which the third toe is larger than the others, and is symmetrical upon itself.

**Peristalsis**, the wormlike movement of the intestine, which presses forward the food by muscular contraction behind it. See **INTESTINES**.

**Peritoneum**, the largest serous membrane in the body, situated in the abdominal cavity. Like the pleura and pericardium it consists of two layers—a parietal lining the walls of the cavity and a visceral closely investing the majority of the abdominal organs, and mooring them firmly in position. Between the two layers lies a potential space, the peritoneal cavity, which in the male is closed—but in the female is in direct communication with the Fallopian tubes to enable the ova to reach the cavity of the uterus.

Various folds of peritoneum pass between the different viscera and the enclosing walls. Similarly there are folds binding the small and large intestine to the posterior wall, and finally a third group of folds connecting other viscera with the abdominal or pelvic walls. While the functions of the peritoneum are chiefly mechanical in diminishing friction and mooring the viscera, the membrane also possesses marked secretory and absorptive powers. Peritonitis, or inflammation of the peritoneum, may be acute or chronic, general or local. A general peritonitis is most usually caused by the introduction of septic organisms into the peritoneal cavity, such as may follow a perforating wound of the abdominal wall.

**Periwinkle**, a plant.

**Periwinkle** (*Littorina*), a genus of gastropods, several species of which are common between tidemarks on North Atlantic shores. The shell is top-shaped, with a short spire and an entire and nearly circular mouth. Of the common forms the largest is the common periwinkle (*L. littorea*), which is commonly boiled and eaten in England. This mollusk, since about 1860, has been acclimated to the North American coast, and now swarms from Nova Scotia to Long Island Sound. Native America species are *L. rudis* and *L. palliata*.

**Perizzites**, a tribe which, before the Israelite invasion, occupied part of Canaan—probably the central and southern districts.

**Perjury**. The criminal offence of knowingly giving false testimony in a judicial proceeding. It has been the subject of legislation from an early period and is today defined by statute in most jurisdictions, but it is a common law offence as well and punishable as such. To constitute perjury at common law a statement must not only be made under oath in a judicial proceeding, but must be material to the issue which is being tried. To constitute perjury the statement must have been made wilfully and with knowledge of its falsity or at least without an honest

belief in its truth. Perjury is generally regarded as a felony and an 'infamous crime,' as that phrase is employed in the courts of the United States.

Subornation of perjury consists of counselling, inciting, or procuring a witness to commit a perjury which is actually committed. See EVIDENCE; OATH. Consult Stephens' *History of Criminal Law*.

**Perkin, Sir William Henry** (1838-1907), English chemist, born in London, and became assistant to Hofmann at the Royal College of Chemistry. In 1856 he discovered a purple or mauve dye formed by the oxidation of aniline, and started its manufacture. He thus founded the aniline or rather coal-tar color industry. He also discovered two processes of manufacturing alizarin.

**Perkins, Charles Callahan** (1822-86), American art critic and historian. He was one of the founders and leading spirits of the Boston Museum of Fine Arts. He was also interested in music, and as president of the Boston Handel and Haydn Society (1870-83) sometimes conducted its concerts. His books include: *Tuscan Sculptors* (1868), both with etchings by the author; *Art in Education* (1870); *Ghiberti et son Ecole* (1885).

**Perkins, Elisha** (1741-99), American physician, born in Norwich, Conn. In 1796 he patented an instrument which he called a 'metallic tractor' for use in local inflammation. The use of the instruments became very popular and medical authorities attributed the cures to a new influence which they called 'Perkinsism.' In 1799 there was a serious epidemic of yellow fever in New York City, and Dr. Perkins volunteered his services in the fever hospital in order to test an antiseptic remedy he had compounded. He was attacked by the fever and succumbed to it.

**Perkins, Frances** (1883- ), first woman to serve in a President's cabinet, was born in Boston. From 1910-12, she was executive secretary of the Consumers' League. She served on numerous industrial commissions and in 1928 was appointed Industrial Commissioner at the head of the New York State Department of Labor. In March 1933, she was appointed Secretary of Labor and served until 1945. (In private life, Miss Perkins is Mrs. Paul Wilson.)

**Perkins, Jacob** (1766-1849), American inventor, born in Newburyport, Mass. In 1787 the state of Massachusetts employed him to prepare the dies for its copper coinage. In 1790 he invented a machine for



making nails. He greatly improved the process for engraving bank notes, and in 1814 removed to Philadelphia and entered the business of bank-note engraving and printing. In 1818 he settled in England, and established a bank-note printing business. He introduced many improvements in steam engines and printing presses, in printing processes and in engraving.

**Perkins, Thomas Handasyd** (1764-1854), American philanthropist, was born in Boston, Mass. From 1805 he served in one or the other houses of the Mass. legislature for many years. He gave his house and lot in Boston for the Perkins Institution for the Blind, besides aiding the Bunker Hill Monument project. Mr. Perkins was a principal organizer of the Quincy Railroad, the first in the U. S.

**Perlitic Structure**, in volcanic rocks, consists in the presence of small concentric cracks, along which the rock readily breaks down, yielding rounded pearl-like fragments. Rocks having this structure are often called *Perlites*.

**Perm**, town and river port in Soviet Russia, 900 m. by water e. n.e. of Moscow, and on the Kama R. It was formerly a depot for convicts bound for Siberia, and is now the center of the large transit trade between Central Russia and Siberia; p. 85,000.

**Permanganic Acid**,  $\text{HMnO}_4$ , is unknown in the pure state, but can be obtained as a crimson, strongly acid solution by decomposing barium permanganate with dilute sulphuric acid.

**Permutations and Combinations**, the branch of algebra which has to do with the simpler problems of arrangement. Let there be, say, ten objects—for example, ten boys in a class. In how many ways may these boys be arranged in groups of four? If no regard be taken of the order in each group, then the problem is one of combinations; but if regard be had to the order, the problem becomes one of permutations. The theory of permutations and combinations has many important applications in the discussion of series, probability, and statistics.

**Pernambuco**, state, Brazil, on Atlantic coast. The interior is mountainous, rising to over 3,000 ft. In the coast lands known as the Mata are plantations of sugar-cane and cotton; coffee, tobacco, and rice are also grown. The fruits of Pernambuco are famous. Recife is the capital. Area, 49,570 sq. m.; p. 2,900,000.

**Pernambuco**, city, state of Pernambuco, Brazil.

**Péronne**, tn., France, dep. Somme, on riv. Somme, 30 m. e. of Amiens. Here Louis XI. was forced to sign a treaty with Charles the Bold of Burgundy in 1468. During the World War Péronne was occupied by German troops, but in March 1917, they were driven out by the British. A year later the Germans recovered the town, but lost it to the Australians in September 1918; p. 4,500.

**Perpetual Motion**. According to the doctrine of the conservation of energy it is not possible to do work without expenditure of energy in some form. Nevertheless many forms of apparatus have been devised by which the inventor believed it possible to gain work without expenditure of effort. If a system could be devised so as to be able to keep up its motion perpetually and at the same time to do useful work, the law of the conservation of energy would be disproved and the perpetual motion discovered. The true perpetual motion must be carefully distinguished from an apparent perpetual motion, in which a system may be made to continue moving indefinitely, but only because it is able to tap some more or less hidden source of energy.

**Perpetuities, Rule against**. A rule of law designed to prevent the limitation of future estates in real and personal property, subject to such contingencies that they will not necessarily become vested within a certain period, considered to be a reasonable time. This period varies in different states, and the subject is generally regulated by statutes. This name is also commonly applied to statutes prohibiting the suspension of the power of alienation of property beyond a fixed period. The English rule provides that future estates must vest within a life or lives in being and twenty-one years, and this is followed in many of the United States. Several states have fixed the period at two lives in being and twenty-one years, and in New York and a few other states it is two lives in being and the period of a minority. The rule against perpetuities applies to estates in trust as well as legal estates. Consult Gray, *Rules Against Perpetuities*.

**Perpetuity**. When property is so held that no one can dispose of the absolute ownership thereof it is said to be held in perpetuity. Various rules have been passed to prevent perpetuities for any great length of time. The rule applies to personal property as well

as real property, and is of great importance in the creation of trusts.

**Perpignan**, chief tn. of French dep. Pyrénées Orientales, stands on river Tet, 7 m. from the Mediterranean. A fortress of great strength, it commands the passage from Spain across the E. Pyrenees. Perpignan did not become French till 1642, and is still half-Spanish, half-Moorish in appearance, while its people resemble those of Catalonia. It has a 14th-century cathedral, and from 1349 to the Revolution had a university. Trade in Roussillon red wine, brandy, cork, silk, and wool; p. 68,835.

**Perrault, Charles** (1628-1703); French writer, born at Paris. He is best known by his prose fairy tales, published in Paris in 1697 under the title *Histoires ou Contes du Temps Passé*. A frontispiece bears the words 'Contes de Ma Mère l'Oye' (Tales of Mother Goose).

**Perrault, Claude** (1613-88), French architect, brother of Charles Perrault, was born in Paris. His greatest work was the colonnade of the Louvre, one of the most beautiful buildings of the 17th century. He was also entrusted with the erection of the National Observatory at Paris, and assisted in the decoration of Versailles.

**Perrin, Bernadotte** (1847-1920), American scholar, born in Goshen, Conn., and graduated (1868) at Yale. Besides his numerous contributions to philological periodicals he edited texts of Caesar's *Civil War* (1882), Homer's *Odyssey*, books i-viii. (1899-94), and the Classical Series in *Twentieth Century Text-Books*, with J. H. Wright and A. F. West, and a translation with introduction and commentary of Themistocles and Aristides in *Plutarch's Greek Lives* (1901).

**Perry, Bliss** (1860- ), American educator and author, was born at Williamstown, Mass. In 1899 he accepted the editorship of the *Atlantic Monthly*. In 1906 he accepted, in addition, the professorship of belles lettres at Harvard. Mr. Perry edited editions of Scott's *Woodstock* and *Ivanhoe*, and a series of *Little Masterpieces*, and he published three novels. He also wrote *A Study of Prose Fiction* (1902), *Walt Whitman*, a biographical and critical study (1906), *A Study of Poetry* (1920), *And Gladly Teach* (1935), etc.

**Perry, James De Wolf** (1871- ), bishop, was born in Germantown, Pa., studied at Cambridge Theological School, entered the ministry in 1896. He was rector of Christ Church, Fitchburg, Mass., 1897-1904, and of St. Paul's, New Haven, Conn., 1904-1911. He

was then consecrated bishop of Rhode Island, and was elected primate of the Protestant Episcopal Church in America in 1930.

**Perry, Matthew Calbraith** (1794-1858), American naval officer, born at Newport, R. I. In July, 1813, during the War of 1812, he was promoted to the rank of lieutenant and from 1815 to 1817 he commanded a merchant vessel. He then re-entered the navy, and in 1819-20 was first lieutenant of the *Cyane*, which convoyed to Africa the first shipload of negroes sent out by the American Colonization Society. He spent the years 1833-43 on shore duty, for much of the time at the Brooklyn Navy Yard, of which he was commandant in 1841-3. He here organized the Brooklyn Naval Lyceum and made valuable contributions to the development of the U. S. steam navy. In 1837 he was raised to the rank of captain, then the highest in the U. S. Navy. Perry was made special envoy of the U. S. to Japan in 1852, and in 1854 he returned to Japan and negotiated a treaty by which the U. S. gained permission to obtain wood, coal, and necessary stores and provisions needed by her ships in Japanese waters, and for her vessels to anchor in the ports of Shimoda and Hakodati. The negotiation of this treaty was Perry's greatest achievement, and is an event of the greatest importance in the history of Japan; the treaty marks the first step in the opening of Japan to foreign commerce and residence. After his return Perry prepared his *Narrative of the Expedition of an American Squadron to the China Seas and Japan* (3 vols. 1856). He died in New York City, Mar. 4, 1858.

**Perry, Oliver Hazard** (1785-1819), American naval officer, born on Aug. 23, 1785, at South Kingston, R. I. He served in the Tripolitan War, first on the frigate *Adams* (1802-3) and afterwards, as a lieutenant, on the *Constellation* (1804-5); and in 1807-10 he commanded a flotilla of seventeen gunboats on the Newport Station. Soon after the outbreak of the War of 1812 he was again placed in command of a flotilla of gunboats and in March, 1813, having been raised to the rank of captain, he was made master-commandant, and was ordered to superintend, under the direction of Com. Chauncey, the constructing and equipping of a fleet for service on Lake Erie. The squadron was ready for service by July 10 but the lack of men long kept Perry in the harbor and he did not sail from Erie until Aug. 12.

On Sept. 10, in the famous battle of Lake Erie, fought off Put-in-Bay, he defeated the

inferior British squadron under Capt. Robert H. Barclay. During this battle Perry displayed seamanship of a high order and great personal bravery. Immediately after the battle Perry sent to Gen. W. H. Harrison the famous message, 'We have met the enemy and they are ours; two ships, two brigs, one schooner, and one sloop.' Perry's victory on Lake Erie aroused the greatest enthusiasm throughout the United States. After the war Perry was again placed in command of the Newport Station, and in 1816-17, as commander of the *Java*, served under Decatur in the Mediterranean against the Algerine and Tripolitan pirates. In 1819 Perry, in com-

panianity became the imperial religion, it unhappily proceeded to mete out towards innovating sects a mode of treatment similar to that it had experienced from the heathen. The Inquisition, which was established for the express purpose of discovering heresy and suppressing it, continued its career far into Reformation times. The reformers were persecuted everywhere, successfully in Spain and Italy; in France, the Huguenots received a dreadful blow in the massacre of St. Bartholomew. The Jews have suffered severely in most European countries, most lately in Germany.

**Perseid Meteors**, a system of small bodies



*Perry at the Battle of Lake Erie.*

mand of several vessels, proceeded to the West Indian waters to protect American commerce, and on his birthday, Aug. 23, died of yellow fever near Trinidad.

**Perry, Ralph Barton** (1876- ), philosopher, author and college professor. He holds degrees from Princeton and Harvard. Since 1903 he has been professor of philosophy at Harvard. He was a major, U. S. A., during the World War. He is author of several books on philosophy, including *The Moral Economy*, *The New Realism* and *The Thought and Character of William James*, which he wrote in 1935 and which won for him the Pulitzer Prize.

**Persecution**, the forcible suppression of opinions and practices obnoxious to established and traditional forms, especially of religion, has been common in almost every age and country. From the time that Chris-

revolving round the sun in an elongated ellipse, which intersects the terrestrial orbit at a point passed by the earth about August 10.

**Persephone**, in ancient Greek mythology, was the daughter of Zeus and Demeter; she was the goddess of the lower world. When Pluto carried her off to the shades, her mother refused to let the fruits of the earth grow; thus mortals could not sacrifice to the gods, and Zeus was driven to compel Pluto to send her back. Hence she was allowed to spend part of the year in the upper world.

**Persepolis**, or *Istakhr*, the cradle of the Persian kingdom, stood in the heart of Persia proper, in the valley of Mervdasht, as it is now called. The palaces of the kings stood some miles away, close beneath a mountain, on a lofty platform ascended by great stair-

cases. The ruins which still remain show that these buildings were the masterpieces of Persian architecture. Persepolis was captured by Alexander the Great towards the end of 331 B.C.

**Perseus**, an ancient constellation extending from Cassiopeia to Taurus, and traversed by the Milky Way.

**Perseus**. In ancient Greek legend, was a son of Zeus and Danaë, the daughter of Acrisius, king of Argos. He was worshipped as a hero in Greece.

**Perseverance of Saints**, the doctrine that those who have been elected, justified, and sanctified can never totally or finally fall away from the state of grace follows necessarily from the doctrine of election.

**Pershing, John Joseph** (1860- ), American soldier, was born in Linn co., Mo. He organized and directed the Bureau of Insular Affairs in 1899; was executive officer of the military department of Mindanao and Jolo, Philippines, in 1900; and commander of the department and governor of Moro province in 1909-1913, during which time he disarmed the natives and established peace. Pershing became a brigadier-general in 1906. He served on the Mexican border in 1914-15, and commanded the U. S. expedition into Mexico in 1916-17, being promoted major-general in 1916. Upon the entrance of the United States into the Great War he became commander-in-chief of the American forces. He was promoted to the rank of general in 1917, and received the thanks of Congress in 1919. He received also the distinguished Service Medal, the French Legion of Honor, the British Order of the Bath, and many other decorations. He was chief of staff from 1921 to 1924, when he was retired from active service.

**Persia (Iran, after Jan. 1, 1935)**, a country of Asia extending from the Persian Gulf and Gulf of Oman to the Caspian Sea. The area is about 628,000 sq. m. The elevated plateau constituting the interior of Persia is traversed by several ranges of mountains. On the n. the chain of Elburz continues eastward from the Armenian plateau, skirting the southern shore of the Caspian Sea. Many of its peaks reach over 12,000 ft., and the range culminates in the beautifully symmetrical volcanic peak Demavend (18,600 ft.). Farther e. is the main range of Elburz. The province of Azerbaijan, in the n.w., is part of the Armenian plateau, and is a land of mountains and broad, fertile valleys. The rivers are small, and many of them dry up in summer.

Most important are the Sefid Rud in Azerbaijan, and the Karum. The latter is the only navigable river in Persia; it flows from the Bakhtiari country into the Shat-et-Arab. There is one large lake in Azerbaijan, the Lake of Urmia, 84 m. long by from 20 to 30 broad. More than half the area of Persia drains into inland lakes and swamps.

On the high plateaus the winters are intensely cold, while the summers, though hot, are agreeable, owing to the elevation. The forested lowlands about the Caspian Sea are moist; the southern section is both hot and dry, and subject to fierce, torrid winds which sweep over the desert wastes. The rainfall is meagre, except in the mountain district of the n.w., and in the provinces of Gilan and Mazanderan, on the northern side of the Elburz range. Between the coast lagoons of the Caspian and the summits of the Elburz Mountains intervene forests of oak, beech, walnut, ash, yew, box, and juniper. Elsewhere the trees grow only in scattered clumps, and most of them are cultivated fruit trees. The fauna include, among wild animals, the lion, tiger, leopard, bear, wolf, lynx, jackal, wild ass, porcupine, deer, mountain goat, and gazelle; the chief domestic animals are the horse, camel, sheep, mule, and ox. Among the birds are the pelican, bustard, pheasant, partridge, grouse, thrush, and bulbul.

The lack of cheap transportation, fuel, and water have prevented successful operation of the mines of Persia, and the development of its great mineral wealth. Some mines of lead and copper have been worked in a desultory manner for centuries. Coal, copper, lead, tin, nickel and iron are also mined. Khorassan contains the famous turquoise mines of Nishapur, copper, coal, lead, and iron. The chief mineral product is petroleum, obtained in the valley of the Karun, and found in a broad belt extending from Kurdistan to the Persian Gulf. The chief occupation of Persia is stock breeding and grazing (sheep and goats). Wheat and barley are grown almost everywhere, also rice and fruit in great variety. In the absence of sufficient rainfall, irrigation is necessary to successful agriculture. Where this is supplied the naturally rich soil is very productive. Fisheries, mainly in the Caspian Sea, are important and profitable.

Tabriz, Hamadan, Sultanabad, and Kirman are the chief manufacturing centers. Beautiful woolen carpets and silk tapestries are made. Shawls are fashioned, especially at Kashmir and Kirman, from the soft un-

derwool of the goat, silk materials, and velvet. There is also a considerable output of silver work tiles, embroidery, mosaics, and inlaid work of ivory, mother-of-pearl, and metal, on wood. The commerce of Persia is extensive, considering the general absence of railroads and the primitive means of transportation. The principal exports of Persia are petroleum, raw cotton, dried fruits, woolen carpets, rice, opium, gums, skins, and cereals, of value in the order named.

The government of Persia is a constitutional monarchy. Up to 1906 the Shah was absolute, controlling the lives and property of his subjects, and the entire revenue of his kingdom. After the revolution, which resulted in a constitution, the Mejliss, an elective national assembly, was established. The Shah is assisted by a cabinet consisting of the Premier, and the Ministers of Foreign Affairs, War, Education, Finance, and Justice. The work of the American financial adviser, A. C. Millspaugh, who undertook the reform of Persian finances in 1922, has brought about a marked change in the financial situation. A budget has been introduced, revenues have been increased, and important steps have been taken for revision of the tax system. The population of Persia is estimated at 15,000,000 of which 2,000,000 are nomadic tribes, and 6,000 Europeans. The chief city is Teheran; p. 350,000. The Persians proper are Mohammedans of the Shiite sect; of these there are about 8,000,000. The Kurds and many of the Arab and Turki tribes are Sunnites; in number, about 800,000. Babiism (see BABI), a revolt against the tyranny of the Koran, has made great progress. There are also a few Parsis, or fire-worshippers, and Armenian and Nestorian Christians. The Persian priesthood exerts a powerful influence, and is generally opposed to the progress of European ideas among the people. The education of the mass of the people extends only to the reading of the Koran, but in recent years schools on European lines have been established.

*History.*—The ancestors of the Medes and Persians at the dawn of their history inhabited, traditionally, a region known as the Airyanem Vaejō ('the Aryan home'), which, doubtless, in some measure corresponded with the province of Aria in classical maps. The Persians proper are mentioned in the Vannic inscriptions as occupying Media, and ultimately the province of Persis, now Fars, to which they gave their name.

Zoroaster persuaded his people to abandon

the worship of the powers of nature, and also preached the immortality of the soul. The religion thus introduced continued to be professed until the Mohammedan conquest of Persia. Nothing more is known until the time of the Greek historians and the cuneiform records of the Arsacides. Cyrus the Great, king of Persia revolted against his suzerain Astyages, the successor of Cyaxares, and by his conquest of Media united the whole Persian empire under his banner. Cyrus' successor, Cambyses, conquered Egypt in 525 B.C. When he died by his own hand (521 B.C.), Darius, a member of the same great Achæmenian family, succeeding to the throne, was forced to suppress rebellions in every part of his vast empire. The Battle of Marathon (490 B.C.) for a time delivered Greece from Oriental conquest. The reign of Darius' son and successor, Xerxes I. (486-461), who subdued the Egyptian rebels in 484, was occupied chiefly by his disastrous conflict with Greece, memorable for the overthrow of the Persians at Salamis (September, 480) and Plataea (479). The reigns of Artaxerxes I. (466-424), Xerxes II., and Darius II. (423-405) witnessed the rapid decline of the Persian monarchy. The celebrated expedition of Cyrus the Younger (401) against his brother Artaxerxes II., ended in Cyrus' victory and death at Cunaxa. Crossing the Hellespont in 334, Alexander defeated the Persians at Issus (333) and at Gaugamela (Oct. 331), thus overthrowing forever the empire of the Achæmenians. Persia then became part of the Macedonian empire; and after the troubles that followed Alexander's death in 323 B.C., eventually fell to Seleucus Nicator (312-280), who built Seleucia, but ultimately transferred his capital to Antioch in Syria. Papak, son of Sasan, founded the Sasanian dynasty in Persis, and was succeeded by his son Ardashir. In the latter the history of Cyrus the Great repeated itself. Defeating the army sent against him by Artabanus, Ardashir took Ispahan and advanced to Hormuz, where (April 28, 227) he overthrew the Parthian monarch and his empire.

Istakhr (Persepolis) now became once more the capital of the Persian empire, of which Ardashir soon made himself sovereign. He overran and annexed Armenia and made Zoroastrianism, in the form which it had then assumed, the only religion tolerated in his dominions. Ardashir was succeeded in 240 by his son Sapor or Shapur I., one of the greatest of the Persian monarchs, and the

Sasanian era endured until the Mohammedans crushed Persian power in 639. For nearly two hundred years after the Arab conquest, Persia formed part of the dominions of the caliphs, and suffered her full share of the almost incessant massacres and civil wars which ensued.

Between 1218 and 1224 Persia, then ruled by Mohammed Shah of Khvarizm, was overrun and almost desolated by the Mongol Jenghiz Khan, who extended his conquests to the Indus. Hulagu, a grandson of Jenghiz, completed the conquest of Persia in 1258, and his descendants ruled for several generations. The country was also the scene of the conquests of Timur-i-Lang (Tamerlane, 1380-1393). In Persia the Safavi dynasty was established by Ismail Shah (1499-1524). The Safavi dynasty was restored by Nadir Quli (Kuli) Khan, who in 1736 proclaimed himself king, with the title of Nadir Shah. Nadir conquered Afghanistan, and carried his arms as far as Delhi, which he captured and plundered, permitting the massacre of some 100,000 of the inhabitants. He ultimately became a bloodthirsty tyrant, and his murder, in 1747, was a great relief to his country. Civil wars succeeded until the reign of Karim Khan, who made Shiraz his capital. The present, or Qajar (Kajar) dynasty is of Tartar origin, and was founded by Aqa (Agha) Mohammed Khan in 1794. This monster of cruelty re-established the Shiite or Shiah form of Islam as the religion of the country (1796). Fath 'Ali Shah, who succeeded on the murder of Aqa Mohammed, engaged in a war with Russia, and lost the Circassian provinces. Mohammed Shah, his grandson, took Herat from the Afghans.

Mohammed Shah left the throne, in 1848, to his son Nasiru'ddin Shah, who was murdered in 1896, and was succeeded by one of his younger sons, Muzaffaru'ddin Shah. In October, 1906, under pressure, the Shah convoked a National Assembly (Mejliss) to frame a constitution. He died in January 1907, and his son, Mohammed Ali, delayed taking oath to the constitution till Nov. 12, 1907, and then did not keep his promises. In 1907 Russia and Great Britain signed an agreement by which each assumed a sphere of influence in Persia—in the northern and southern parts respectively, and recognized the independence and integrity of the country. This agreement was recognized by Persia in 1912. In 1910, at the request of the Persian government, U. S. President Taft appointed W. Morgan Shuster as financial ad-

viser to Persia. Shuster arrived in Teheran in May, 1910, and was invested by the Persian Mejliss with plenary powers in fiscal affairs. In spite of obstacles, in six months the treasury deficit was converted into a surplus, besides furnishing funds for the suppression of a rebellion.

Following the outbreak of the war, the National Assembly was summoned and the neutrality of Persia proclaimed. Western and Northwestern Persia formed a battleground for the Turkish and Russian armies, and as a result Persia suffered a considerable loss of property and some loss of life. The Persian province of Azerbaijan was devastated, and terrible massacres of Armenian and Nestorian Christians occurred. In 1916 a troop of Persian soldiers was organized under the British general, Sir Percy Sykes, to restore and maintain order in Southern Persia. In 1920 Bolshevik forces invaded Persia and occupied Resht, and in 1921, a treaty was concluded between Persia and Soviet Russia establishing diplomatic relations and superseding all previous Russo-Persian treaties. In August 1921, a contract was signed between the United States and Persia, whereby Dr. A. C. Millspaugh, formerly connected with the U. S. State Department, became administrator-general of the finances of Persia. Under his guidance, free for the first time in many years from foreign influence, there was a marked improvement in Persia's financial condition and closer commercial relations were established between the two countries.

In 1933, a new concession for 60 years for the Persian oil field, the richest single field known, was awarded to the Anglo-Persian Oil Co., under the auspices of the Council of the League of Nations.

Among other results of westernizing influences, the government has restricted the wearing of turbans or fezzes to religious leaders. In 1930 laws were passed which required all natives of Persia residing abroad to return home within one year or suffer the loss of both their citizenship and property in Persia, and foreigners were restricted to owning no real estate other than dwelling houses. The sovereign of Persia, a constitutional monarchy, is called the Shah, and the present Shah, Mohammed Riza Pahlevi, was enthroned Sept., 1941. In 1941 Britain and the Soviet Union partially occupied Iran, driving out all German nations, and in Jan., 1942 an Anglo-Soviet-Iranian treaty was signed by the three governments.

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**Persia, Language and Literature.** The Persian language is a branch of the great Aryan or Indo-European family of languages. The earliest form of the language which has been preserved is found in the inscriptions of the Achæmenian kings. The oldest form of modern Persian, represented by the language of the *Shâhnâmah*. This was followed by what is known as the classical Persian of the great writers of later times.

The language at present spoken in Persia contains a somewhat larger proportion of Arabic words, though a considerable number of Turkish words may also be met with. The date of the composition of the *Gâthâs* has been supposed to be about the 14th century B.C., while the rest of the *Avestâ* was composed probably between the 5th and 1st century before the Christian era. The Mohammedan conquest for a time put an end to all literary life in Persia, but the nation ultimately developed a new literary language. The earliest prose work in what is now known as Persian is Bal'ami's version of Tabari's *Universal History* (A.D. 963). The greatest epic poet of Persia is Firdausi (940-1020), who after thirty-five years' toil published his *Shâhnâmah*, or 'History of the Kings of Persia,' in 1011.

The most renowned of the philosophical poets of Persia is Jalalu'ddin Rumi (1207-73). Sa'di (died in 1292) is celebrated for his *Gulistân* and *Bustân*. With these may be coupled the *Gulshân i Râz* of Mahmud i Shabistari (died 1320), and the *Bâharistân of Jami* (1487). 'Umar (Omar) ibn Khayyam represents the sceptical and Epicurean school; his verses have obtained great popularity in England and the United States. The greatest lyric poet of Persia is undoubtedly Hafiz (died in 1389). His verses breathe the same Epicurean spirit as those of Omar Khayyam, but their sweetness and musical charm are far superior. Among prose writers of fiction, one of the best known is Muhammed Taqqi Khan (1742-56), author of a voluminous work entitled *Bustân i Khayâl*, or 'The Garden of Imagination.' Persia has produced not a few able historians, among whom may be

mentioned the names of Khvandamir, Mirkhvand, Juvaini, and Vassaf.

Among the most important modern works in the language are the journals (*Râznâmah-hâ*) of Nasir'u'ddin Shah. These are composed in the ordinary colloquial form of modern Persian. They have thus introduced a much more simple and intelligible style of composition. Consult Browne's *Literary History of Persia* (1902); Levy's *Persian Literature* (1923).

**Persian Architecture.** In ancient Persian architecture sundried brick was chiefly used, beautifully enamelled in color for decorative purposes. Persian architectural luxury reached its height in the great Hall of Persepolis, with its huge capiteled pillars, stairs, and vast area. Not till after centuries of stagnation and ruin did a new style of architecture appear with the Mohammedan conquest. This style shows at its best in the mosque and mausoleum. Use is made of blue-colored tile and bricks and the keel dome predominates. See also ARCHITECTURE.

**Persian Gulf**, an arm of the Arabian Sea, running north westward from the shallow Strait of Ormuz between Persia and Arabia. Its length is about 550 m., and its greatest breadth about 200 m. It has an area of about 75,000 sq. m. The shores on the Persian side are high and precipitous; on the Arabian side they are low and flat. The water is very warm. Great Britain exercises a protectorate over the Bahrain Islands, and enjoys a measure of domination over the entire Gulf.

**Persian Lamb**, a fur obtained from the karakul or Arabi sheep, of Bokhara. The young lambs are usually jet black, with a lustrous wool closely curled over the entire body. When used for fur, they must be killed when not older than ten days, as the curls open after this period.

**Persigny, Jean Gilbert Victor Fialin, Duc de** (1808-72), French public official, was born in Saint-Germain-l'Espinas, Loire. On the overthrow of the Orleans dynasty (1848), Persigny secured the election of Louis Napoleon to the Constituent Assembly in June and September, and to the presidency of the republic in December, 1848. In 1855-60 he was ambassador at London.

**Persimmon**, or **Date Plum**, belongs to the genus *Diospyros*, a genus of mostly tropical trees. *D. virginiana* is a medium-sized tree, often fifty ft. or more in height. Its fruit is much like a reddish-yellow plum, containing

eight or ten seeds, very astringent when immature, but sweet and delicious when ripe or touched by frost.

**Persius** (34-62 A.D.), Roman satirist, was born at Volaterræ in Etruria; his full name was Aulus Persius Flaccus. His one surviving work, six satires, attained great popularity. The subject of his satire is the Rome of his day, with all its vices and follies. See complete bibliography of Persius by Morgan (1893).

**Personality** (double or multiple), or double consciousness, is a name given to certain striking cases of alternating personal identity. The change of identity occurs at a hysterical crisis. The normal state can usually be restored by hypnotic treatment. Sometimes the change lasts only for a few seconds. In normal persons the dream state often affords analogous phenomena. The identity established in a dream is lost on waking, and may be re-established on sleeping. By minute study of cases it has been shown that they are all explicable as cases of dissociation of consciousness. (See HALLUCINATION, ILLUSION, HYPNOTISM.) In a normal person such dissociation is usually evanescent.

**Personal Liberty Laws**, a series of laws passed in various Northern states, prior to the Civil War, to prevent or make difficult the rendition of fugitive slaves from these states to Southern slave owners. These laws were an expression of the hostility felt by Northern communities for the Fugitive Slave Acts and were undoubtedly one of the causes of the ultimate outbreak of hostilities between the North and South. See FUGITIVE SLAVE LAWS.

**Personal Property**. In general such property rights as, upon the death of the owner intestate, pass to his personal representative as distinguished from his heir, upon whom the real property descends. It includes not only chattels proper, or 'chattels personal,' corresponding to the movables of the Roman law, but certain interests in land also, such as estates, real mortgages, etc., known as 'chattels real,' and which have for years for various reasons fallen into the category of property devolving upon the executor or administrator. Personal property law is much simpler than that of real property and has never shared the complexity and artificiality of the latter.

**Personal Representative**. An executor or administrator of a deceased person. Sometimes the term is used to mean the next of kin, or the person or persons to whom the

personal estate would go by law if there were no will. See EXECUTORS AND ADMINISTRATORS.

**Perspective**. A drawing of an object may show either its actual or its apparent size and shape. The former is geometric or orthographic drawing—i.e. parallel projection; the latter is perspective drawing, or projection from a fixed point—i.e. radial projection. Perspective deals wholly with appearances, but objects have both an apparent form and an apparent color. Both seem to differ much as we look from different standpoints, and they are quite separate studies. The study of the apparent forms or shapes is called 'linear perspective.' The study of the apparent changes in color is called 'aërial perspective.' Because of the varying atmospheric conditions no definite rules regarding aërial perspective can be laid down. Linear perspective, however, is an exact science, based on the fact that a straight line passes from any point in an object at which the spectator is looking to the eye of the spectator, a ray of light carrying with it the impression of the point to the eye. From this fact rules or axioms are deduced, and by the application of these, drawings of objects can be made which will be exactly similar in form to the apparent form of objects as seen from any fixed point. A knowledge of solid geometry or of orthographic projection is of great assistance in understanding this subject; indeed, perspective drawing is but a development of solid geometry.

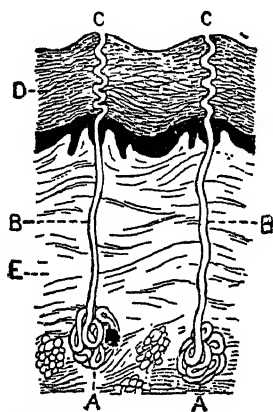
**Perspiration**, an excretion from the sweat glands of the human skin. On an average a healthy male adult loses daily in this way some 18 ounces of water, about 300 grains of solid matter, and about 400 grains of carbon dioxide. Should perspiration be rapidly excreted or slowly evaporated, it becomes visible; but even when it does not gather in drops, an invisible perspiration is continually going on.

**Perth**, Ontario, Canada, county seat of Lanark co. on the Tay River, which connects with the Rideau Canal. It is a shipping point for live-stock and has important manufactures. The district is rich in minerals particularly phosphate of lime; p. 4,097.

**Perth**, city, Scotland, capital of Perthshire, on the River Tay. Its beautiful site has won for it the name of the 'Fair City,' and its historic associations have added to its interest. The kings of Scotland frequently resided in the Cistercian abbey, and many Parliaments



were held in Perth. Here is St. John's Church, a 13th-century structure in front of whose high altar King Edward III. of England stabbed his brother, the Duke of Cornwall. Near the river are two public parks, known as the North and the South Inch, in the former of which took place in 1396 the famous combat between the clans Chattan and Quhele described in Scott's *Fair Maid of*



*Sweat Glands from Skin of Thumb.*

AA, Sweat glands; BB, ducts; CC, openings on surface; D, epidermis; E, derma.

**Perth.** Nearby stood the Dominican Convent in which James I. was assassinated. Perth is the chief center of the dyeing industry, and has manufactures of linen, carpets, glass, and ink. It has also large cattle markets. The salmon fisheries of the Tay are valuable; p. 28,613.

**Perth,** town, capital of West Australia, on Swan River. The situation is one of great natural beauty, and the city is well built, with wide streets and numerous fine buildings, including the Town Hall, House of Parliament, Anglican and Roman Catholic Cathedrals, and Council Chambers. Perth Park and King's Park are beautiful pleasure grounds; p. 41,000.

**Perth Amboy,** city, New Jersey, Middlesex co., on Raritan Bay, at the mouth of the Raritan River. It is connected by a bridge with South Amboy. A bridge links it to Staten Island (New York City) at Totentville. Features of interest are the capitol building of the province of East Jersey, and the barracks used by the English soldiery. William Franklin, the last royal

governor of New Jersey, was captured here in 1776. Industrial establishments include manufactures of terra cotta, lead, copper, steel, cable, emery, and chemicals; and the city has shipyards and drydocks. The first settlement was made in 1683 and the place was named in honor of the Earl of Perth. Amboy, a corruption of Ompage, the original Indian name, was added by popular usage. It was the capital of the province from 1684 until about the time of the Revolution. It is a port of entry and is served by the Central Railroad of New Jersey, the Lehigh Valley Railroad and the Pennsylvania Railroad; p. 41,242.

**Perthite,** a variety of orthoclase feldspar in which small veinlets are present.

**Perthshire,** county of Scotland, s. of Inverness and Aberdeen, and n. of Fife and Stirling, with an area of 2,493 sq. m., in the heart of Scotland. In the north the Grampian Mountains cover a large area. The rivers Tay and Forth drain Loch Tay, Loch Katrine, and many other picturesque lakes.

**Perturbations,** an astronomical term denoting inequalities in the motions of the heavenly bodies due to irregular attractions. Those affecting the planets are classed as *periodic* and *secular*. The first kind depend upon the relative positions of the disturbing and disturbed body: they alter the place of the latter in its orbit, not the orbit itself; and they are compensated when the original configuration of the two planets and the sun is restored. They are hence comparatively transient and of small amount. Secular perturbations are conditioned by the slowly modified relative positions of the various orbits, and are compensated when these revert to their primitive status as regards each other and the plane of the ecliptic. They accordingly require immense lapses of time for their development. Lunar disturbances result from the unequal action of the sun, and are due to the difference in the attraction of the sun at a given moment upon the earth and moon. They are mostly periodic. The orbits of comets are often radically altered by planetary influence. The return to perihelion of known comets is, besides, advanced or delayed by the attraction of the planets met with on the way.

**Peru,** republic, South America, extending along the Pacific Coast from  $3^{\circ} 21'$  to  $18^{\circ}$  s. lat. It is bounded on the n. by Ecuador and Colombia, on the e. by Brazil and Bolivia, on the s. by Bolivia and Chile, and on the

w. by the Pacific Ocean. The possession of a strip of territory north of the Marañon is disputed with Ecuador and Colombia. The length of the country from n. to s. is about 1,200 m., while its width varies from 50 to 780 m. The total area is 481,698 sq. m. The greater part of Peru is occupied by the South Andes Mountains, which extend in a broad belt north and south through the country. Between the Western or Maritime Range and the Cordillera Central, which is the main continental divide, lies a series of valleys and plateaus in a belt 50 to 150 m. wide, usually known as the *Sierra*. Its elevation varies from 4,000 to 10,000 ft. East of the Cordillera Central, or main range of the Andes, lie a still more elevated plateau and series of valleys, known as the *Puna*, varying in altitude from 9,000 to 14,000 ft. On the eastern side of the Cordillera Oriental lie the upper slopes of the great forest-covered plain of the Amazon, known in Peru as the *Montaña*. The mountains of the Eastern Range are the highest, some of the peaks reaching 16,000 to 22,000 feet. The mountain passes are among the loftiest in the world—that between Lima and Tarma being 15,760 ft. The active volcanoes belong in the two western ranges. The region immediately about Lake Titicaca, one of the most noted large lakes in the world, because of its elevation (12,545 ft.), is a drainage province in itself. Lake Huacachina has attracted attention because of the remarkable medicinal properties of its waters. The plateaus of Peru are the highest occupied lands in the world, next to those of Tibet.

Although there are more than forty Peruvian ports, none has a first-class harbor. Callao, the port of Lima, is shielded by the large barren island of San Lorenzo. In many of the ports the surf is so violent that landings are sometimes delayed for days. On the east side ocean steamers can penetrate Peru from the Amazon to Iquitos, 3,000 m. from the Atlantic Coast, and light-draught vessels penetrate several hundred miles farther on the three large tributaries. Peru has almost every variety of climate from the torrid heat of the deeper valleys to the arctic cold of the perpetually snow-capped mountains. The high plateaus of the interior are exceedingly cold, while the intermediate valleys are temperate and salubrious. The table lands have an average temperature of 60° F. Except along the coast, where the south wind is almost constant, the winds are prevailing

from the east, belonging to the trades, which accounts for the unequal distribution of rain.

The character of the animal and plant life of Peru varies with the three main physiographic divisions of the country. The coast, owing to its arid nature, has but little vegetable life, except in the river valleys where palms and willows grow, and cotton, Indian corn, sugar cane, alfalfa, and rice are cultivated. Along the sea coast great flocks of sea birds are to be found. The mountainous section, owing to its variety of elevation and temperature, produces many varieties of plant and animal life. Here are found the potato and other edible roots, as well as fruits in great abundance, notably the alligator pear, chirmoya, paccay, lucuma, and fruit of the passion flower. The most important animals are the llama, alpaca, and wild vicuña, all valuable for their wool. Varieties of deer, the viscacha, and the chinchilla, are also found. The *montaña* is a region of tropical forests. Here grow cinchona trees, valuable for their yield of quinine and cinchonine, timber trees of many kinds, rubber trees, incense trees, tree ferns and palms, sarsaparilla, vanilla, ipecacuanha, and copaiba. Cocoa, coffee, sugar, cacao, and tropical fruits are valuable products. In the forests are found monkeys, venomous snakes, bright-hued parrots, tapirs, and other animals common to the South American jungle. The Andean bear, called *ucumari*, is found on the upper borders of the forests. The puma also roams over the higher slopes. Lower down there are jaguars, and several kinds of wild cats. Deer frequent the open ground, and herds of peccaries traverse the forests. Spoonbills, ibis, cranes, snipe, and curlew frequent the lagoons.

Quantities of valuable woods are found in the immense forests in the east, but lack of transportation facilities has rendered them practically inaccessible. Among timber woods are cedar, walnut, ironwood, and caoba, a kind of mahogany. These forests also produce the cinchona, or Peruvian bark, from which quinine is made, and other medicinal plants. Among the most valuable products of the Peruvian forests is rubber.

The mineral supply of the coast ranges and of the Andes constitutes one of the principal sources of the nation's wealth. Gold, silver, copper, petroleum, coal, nitrates, vanadium and, to a less extent, bismuth, mercury, tungsten, nickel, antimony, iron, sulphur, borax, salt, and peat are found. Copper occurs in abundance, the most extensive deposits be-

ing in the vicinity of Cerro de Pasco, Casapalca, and Morochocha. Considering the possibilities of regions still undeveloped, Peru is likely to become an important factor among the world's copper producers. Silver, together with lead, is abundant on the eastern slopes of the Andes. Before the development of copper mining this was the most important metal mined. Over 50,000 tons of pure silver are said to have been taken from the Cerro de Paco region since 1630. Mercury was the first metal to be exploited in Peru. It was formerly in great demand for the treatment of silver ores, and was produced in large amounts. Peru is undoubtedly rich in both anthracite and bituminous coal, if the limited explorations made are a just indication. The oil fields of Peru are a source of considerable wealth, and their development is constantly increasing so that petroleum is Peru's most important mineral. There are four leading fields. The wells along the coast run from out in the sea many miles inland, and vary in depth from 250 to 3,048 ft. Among non-metallic minerals, the guano deposits on the islands of the coast are of great value. Nitrates are also found in large quantities.

The most important agricultural product is sugar cane. It thrives best along the river valleys and in the La Libertad and Lima districts. Cotton is also an important product, and much coffee is grown. The cultivation of coca, from which medicinal cocaine is obtained, is an important industry in some parts of Peru. Grapes, tropical fruits, and all kinds of vegetables are raised in large quantities. Cassava is cultivated up to an altitude of 6,000 ft.; maize is grown in all parts of the country, up to 15,000 ft., and wheat is raised in the valleys of Central Peru. Raising of live stock is an important industry, the best known cattle and sheep raising districts being on the table lands. Peruvian cattle are medium-sized, and rather inferior for food and dairy purposes, but are commercially valuable for their hides. The sheep, llama, alpaca, and vicuña are bred for their wool, over 15,000,000 pounds of this product being obtained yearly. Goats are considered valuable for their skins, which are of unusually fine texture, soft, and easily handled. The leading industries of Peru are agriculture and mining; but there is every reason to believe that it will one day become an important manufacturing country, because of its possibilities of developing im-

mense water power and its abundance of raw materials. The Peruvian government gives active assistance in the matter of increasing the trade of Peru and fostering the knowledge of its growth in other countries.

There are in Peru 2,725 miles of railroads, about 70 per cent. owned by the government and operated by the Peruvian Corporation. Roads in the interior are well-developed. There are in all 13,000 miles of improved highways. Much progress is being made in road construction upon which 25,000,000 soles was spent and 20,000 men employed in 1938. Peru has well established air transport service, both internally and to other countries. Telegraph, telephone, post and wireless service are in the hands of the Marconi Company under a contract running from 1921 to 1946. There is direct cable communication between Peruvian and other ports on the west coast of South America, with good service to all parts of the world. Steamship communication is maintained with other South American countries and with the ports of the United States, Europe and Asia.

The (estimated) population of Peru is 6,673,000. Lima, the capital, has a population of 450,000. Callao, the port of Lima, has a population of 80,000; Arequipa, of 75,000; Cuzco, the ancient seat of the Inca empire, of 40,000. The state religion is Roman Catholic, with complete religious liberty. The churches and monasteries are state property; about \$150,000 is voted annually for public worship. Education is free and compulsory from 7 years to 14. There are good higher schools; secondary vocational schools; and for higher education there are normal schools and universities. The Universidad de San Marcos, the oldest university in America (1551), is situated at Lima, and there are also universities at Arequipa, Cuzco, and Tripillo. In 1921 the University of Technical Schools comprising advanced schools of engineering, commerce, pedagogy, and agriculture was established.

The republic of Peru, with a constitution modelled upon that of the United States, is politically divided into twenty departments and three separate provinces.

*History.*—From ancient times there were communities in Peru. Eventually all united under one empire, and the Incas, in the course of some five centuries, had reached an advanced stage of civilization, previous to the Spanish invasion under Pizarro in 1531. Peru was made a viceroyalty of Spain in 1544;

PEONIES



and the quarrels of successive viceroys and their officials, with occasional revolts among the natives, constitute the greater part of the country's history from the middle of the sixteenth to the beginning of the nineteenth century. The independence of Peru was proclaimed in 1821, but not until 1824 was the Spanish rule actually thrown off. A republic was organized and Simon Bolivar became dictator. In 1879 war with Chile broke out. Chile was successful, humbling both Peru and her ally, Bolivia, and in 1880 all the southern part of Peru was in the power of the Chilean commander, Baquedano, who finally made his way into Lima. In 1883 a treaty of peace was signed, whereby the district of Tarapacá became part of Chile, while the territories of Tacna and Arica were occupied with the proviso that the people of those territories should decide at the expiration of ten years with which of the countries they would cast their lot. When, however, the appointed term had been completed (1894), a dispute arose as to who were entitled to vote on the matter of the final disposition of the province. Peru contended that only those who were resident there when the original treaty was signed should vote; while Chile, who had actively promoted Chilean colonization of the provinces, maintained that all the inhabitants should have a voice in the matter. After a long period of fruitless negotiations, diplomatic relations between the two countries were severed in 1910. In 1929 this old dispute with Chile over Tacna and Arica was settled (see **TACNA-ARICA QUESTION**), and boundary disputes with Bolivia, Colombia, Ecuador and Brazil were satisfactorily adjusted. A dispute with Colombia over the border region of Leticia, which had involved bloodshed in the early part of 1933, was settled by an agreement signed by Peru and Colombia, May 25, 1933, with the contested area administered by a commission of the League of Nations. In 1914 a successful revolution deposed President Billinghurst, who was accused of high-handed methods that threatened the destruction of constitutional government. Dr. José Pardó was elected to the presidency on August 18, 1915. On October 6, 1917, Peru severed diplomatic relations with Germany. In 1919 Augusto Leguia seized the presidency by a coup d'état which was legalized by Congress. After eleven years of dictatorship President Leguia was forced out by a revolution on Aug. 25, 1930 and Col. Cerro was sworn in as prov-

isional President with a military cabinet. Civil war broke out; in February-March, 1931, there were four changes in the presidency. Following the assassination of President Cerro in 1933, a new constitution was put into effect debarring the President from seeking re-election. Gen. Oscar R. Benavides has been President since 1933. The Pan-American Conference was in Lima, December 1938. In Jan. 1942, at the Pan-American conference held in Brazil, Peru signed the declaration against the Axis powers.

**Peru, Ancient Civilization.** The Incas, a Quichua-speaking race, established their capital at Cuzco in the 12th century, and gradually extended their dominion from Quito to the borders of Chile. In astronomical science and chronology they were inferior to the Aztecs, and their buildings were more simple, though massive, being seldom more than one story high, and roofed with thatch. The arch was not employed, though known to the Chimus. In road making, however, the Incas excelled, as well as in agriculture, irrigating their fields by means of aqueducts, manuring them with guano, and dragging through the soil a kind of coulter after the manner of a plough. They were also adepts in the working of gold, silver, and precious stones, though their tools were only of bronze; and their fabrics of cotton and vicuna wool were beautiful in both texture and coloring.

The government was despotic, and the common people (those not of Inca race) were rigidly controlled in all their actions. Their work was allotted to them; they were even obliged to marry at a certain age. On the other hand, no man was suffered to want the necessities of life, and justice was duly administered. The Incas worshipped the sun, and the moon and stars as subordinate deities, and their rites were not attended with such cruelty as those of the Aztec war god.

**Perugia**, province, Central Italy, is mountainous, and is traversed by the River Tiber and others, and contains Lake Trasimene. The principal products are wheat, wine and oil. Area, 3,749 sq. m.

**Perugia**, the capital of Perugia province, Italy, stands on the right bank of the Tiber. The Gothic Cathedral of San Lorenzo, dating from the end of the 15th century, the Church of St. Dominic (1632), and the remarkable Church of St. Peter (11th century) are the best-known churches. The Univer-

sity was founded in 1308 by Pope Clement v. (1307). Perugia, one of the 12 Etrurian republican cities, was incorporated with the Papal States in 1512, and annexed to Italy in 1860. In the 15th century it became the center of the Umbrian school of painting; p. 81,000.

**Perugino**, properly **Pietro Vannucci** (1446-1524), Italian painter, head of the Umbrian school, master of Raphael. He painted in Florence, Rome, Venice, and Cremona. At Rome, whither he went about 1483, Sixtus IV. employed him in the Sistine Chapel; his fresco of *Christ Giving the Keys to Peter* is the best of those still visible. In 1499 he painted the beautiful frescoes in the Sala del Cambio of Perugia, the city of his adoption. Perugino led a wandering life, but after 1502 worked mostly in Florence.

**Peruvian Bark**, the dried bark of the stem and branches of various species of cinchona.

**Peruzzi, Baldassare** (1481-1536), Italian architect and painter, was born near Siena. In 1516 he designed the Villa Farnesina, remarkable for its graceful design and the delicacy of its detail. In 1520 he succeeded Raphael as architect to St. Peter's, but his design for its completion was not carried out. At Siena, he executed a number of frescoes and panel paintings, the principal being *The Sibyl Announcing the Nativity to Augustus*, in the church of the Madonna di Fontegiusta. He died at Rome, and was buried by the side of Raphael in the Pantheon.

**Pescadores**, or **Hokoto**, group of about twelve islands off the w. coast of Formosa, China Sea. The group was ceded by China to Japan in 1895. Area, 70 sq. m.

**Peshawar**, capital of Northwest Frontier Province, India, near the entrance of Khyber Pass. It is the terminus of a railway, and commands the caravan route between Afghanistan and India. Its bazaars form an important market for Afghan and other merchants; p. 104,452.

**Peso**, a gold or silver coin current in many of the South American states, varying in value.

**Pessimism** is the doctrine that on the whole the world is bad rather than good. It may mean either (1) a mood or attitude toward life in which men despair of attaining, or regard life as incapable of yielding, any real happiness or satisfaction; or (2) a philosophical theory in which such a view of life is justified by psychological and metaphysical reasoning.

Pessimism, as a comprehensive philosophical

theory, is modern and even recent, being connected with the names chiefly of Schopenhauer and Hartmann. For these thinkers the misery of life is only an outcome or expression of a profound irrationality in the very nature of the world principle itself. In Schopenhauer's philosophy, for example, the world principle is conceived as a blind will, whose restless striving can bring only dissatisfaction and misery to the beings that are its finite embodiments, so that the only hope for man lies in negating, as far as possible, this will in himself. And this negation, he holds, is best achieved in that passionless or disinterested contemplation of beauty and truth which art and science open up to us, because in such contemplation we are freed for the time being from the bondage of desire, and raised above the cravings and disappointments and miseries of our ordinary life into the rest and peace of an ideal world.

**Pestalozzi, Johann Heinrich** (1746-1827), Swiss educational theorist, was born in Zurich. About 1775 he gathered together a number of destitute children, and put into practice his educational theories, which were based largely on Rousseau's return to nature. After a five years' struggle, Pestalozzi withdrew from practical life, to think out the educational problem. His *Evening Hours of a Hermit* was the first unit of his meditations. Then came a social novel, *Leonard and Gertrude*, which attracted much attention. Under the patronage of the Swiss government, he opened an experimental school at Berthoud. While there he published *How Gertrude Educates Her Children*, which is the recognized exposition of the Pestalozzian method. In 1805 Pestalozzi moved his school to Yverdon, which here drew upon him the eyes of all Europe. Pestalozzi awoke men to a sense of responsibility to childhood. The many foreign teachers who came to him for training spread abroad his theories, which have become the commonplaces of the science of education.

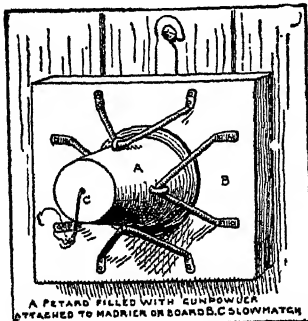
**Pesth.** See **Budapest**.

**Pestilence**, in the Italian medical schools of the Renaissance, meant any dangerous, contagious, infectious disease. Later, black death or bubonic plague, smallpox, and typhus were described under the term pestilence, pest, or plague. The name is not now used to signify any specific disease.

**Pétain, Philippe** (1856- ), French dictator, was born near Calais, and entered the military academy of Saint-Cyr in 1876. He was assigned to the famous Chasseurs à Pied; was made a captain in 1890; passed

two years in the Ecole Supérieure de Guerre; became a member of the general staff; and in 1901 was made professor of infantry tactics at the Ecole Supérieure. At the outbreak of the Great War he was placed in command of an infantry brigade; on April 20, 1915, was made a general of division in command of the Thirty-Third Army Corps; and on June 21, 1915, was put in command of the Second Army. After his defence of Verdun he was promoted to the command of the Armies of the Center, from Soissons to Verdun; in December, 1916, was made a marshal of France and adviser to the War Council; and in April, 1917, succeeded General Nivelle as supreme head of the French Armies in France. His greatest fame is based upon his heroic defence of Verdun, February to June, 1916, from the repeated assaults of the German armies; and his stirring declaration 'They shall not pass!' will go down in history. He was elected to the French Academy in 1931 and in the same year visited the United States to represent France in the celebration of the 150th anniversary of the surrender of Lord Cornwallis at Yorktown, Va. He was Premier when France surrendered to Germany, 1940, and assumed dictatorial powers. He was Chief of State under Hitler; in 1945 he was convicted by the French of intelligence with the enemy and was given the sentence of national dishonor and death. In view of his age it was recommended that the sentence should not be carried out, and Gen. De Gaulle commuted it to perpetual imprisonment.

**Petal**, one of the individual parts of the corolla of a flower. See COROLLA.



*Petard.*

**Petard**, in warfare, a now obsolete engine for blowing open the gates or effecting a breach in the walls of a city or a fortress. It consisted of an iron receptacle in the shape of a half cone, filled with gunpowder. The plank

to which it was fastened was attached by hooks to the wall or palisade to be destroyed.

**Peter**, one of the twelve disciples of Jesus. His original name was Symeon, for which the Greek name Simon was often used; the surname Peter (Petros) is the Greek translation of the Aramaic Kepha (Græcized *Cephas*), 'a rock,' and was given to him by Jesus. Simon was probably a native of Bethsaida, and with his brother Andrew was a fisherman on the Lake of Galilee. Peter began to take a leading place in the Christian community after Pentecost. According to ancient and well authenticated traditions, he was the organizer of the church in Antioch (Syria), and spent his last years in Rome, being martyred there about 64 A.D. Tradition says that he was crucified head downward. Beside the Epistles (See **PETER**, **FIRST AND SECOND EPISTLES OF**), the Gospel of Mark is ultimately traceable to him; also a *Gospel of Peter*, a *Preaching*, an *Apocalypse*, and books of *Acts* bearing his name.

**Peter, First and Second Epistles of**, two of the catholic epistles. The first epistle is addressed to the dispersed (Christian) Jews in Asia Minor. It purports to have been written from Babylon, but many scholars understand this as a metaphorical name for Rome, in which case it would corroborate the tradition that Peter spent his closing years in the latter city. The second epistle of Peter consists mainly of warnings against heretical teachers, and exhortations to growth in Christian knowledge and character.

**Peter I. (Peter the Great)** (1672-1725), Tsar of Russia, was the son of Tsar Alexis and his second wife, Natalia Naryshkin. At the age of 17, Peter took the reins of government into his own hands (Sept. 17, 1689). He began his military career by entering into war with Turkey (1695). In the meantime he had become strongly impressed with the advantages of Western civilization, and in 1697 he resolved to travel through part of Europe. He went to Zaandam in Holland, where he worked in the dockyard; then to England. In 1699 Peter joined the Polish and Danish kings in an alliance against Sweden. By a series of victories, he obtained, in 1721, the position of supremacy in the Baltic, formerly held by Sweden. Westernizing tendencies were seen in changes in dress and customs, the establishment of newspapers, encouragement of foreign trade, and in the building of St. Petersburg to supplant the old capital of Moscow. Peter was married in 1712 to Martha Skavronskaya, a Livonian or Lithuanian peasant, who, upon her admission to the Greek church took

the name of Catherine. (See CATHERINE I.)

**Peter II., Alexeivitch** (1715-30), Tsar of Russia, grandson of Peter the Great, succeeded Catherine I. in 1727.

**Peter III.** (1728-62), Tsar of Russia, was the son of Anne, eldest daughter of Peter the Great. He married, Aug. 21, 1745, Sophia Augusta of Anhalt-Zerbst, afterwards Catherine II.; was proclaimed emperor Jan. 5, 1762; deposed by his consort July 10 the same year; and murdered at Ropsha, July 18.

**Peter I., Karageorgevitch** (1846-1921) king of Serbia, and first king of the Serb-Croat-Slovene state (See YUGOSLAVS), was a grandson of the Serbian patriot George Czerney, surnamed Karageorge, or Black George, and a son of Alexander, who became Prince of Serbia in 1842 but was deposed in 1858. He was born in Belgrade, served in the French army, and on the assassination of Alexander I. and his consort, Queen Draga (June 11, 1903), became king of Serbia. Shortly after his accession Peter restored the constitution of 1889, which had been abrogated in 1894. He took the field with the Serbian troops in the Great War and after the organization of the new Serb-Croat-Slovene state, became its king. He was succeeded on his death, in 1921, by his second son, Alexander.

**Peterborough**, city, England, in Northamptonshire on the Nene. The town grew up around a Benedictine monastery founded in 655, destroyed by the Danes 870, refounded 1117. The magnificent west front of three arches, the distinguishing feature of the cathedral, was erected between 1200 and 1238, and the eastern chapel in the 15th century. Other notable structures are the quaint town hall, the Bishop's palace, and the church of St. John the Baptist; p. 43,558.

**Peter Martyr**, name given to **Pietro Martire di Anghiera** (c. 1457-1526), Italian historian. He was appointed tutor to the Spanish royal family by Ferdinand and Isabella. His historical works include *De Orbe Novo Decades* (1516), which treats of the first thirty years of American discovery.

**Peter Martyr** (1500-1562), Protestant reformer, native of Florence. Visiting England on Cranmer's invitation, he became in 1547 professor of theology at Oxford, and took part in the preparation of the Book of Common Prayer (1552), but was forced by the persecution under Mary to leave England.

**Peters, Karl** (1856-1918), German explorer, was born in Neuhaus, on the Elbe. In 1884 he founded at Berlin the German Colonization Society, in whose interests he traveled

in East Africa, leading the expedition for the relief of Emin Pasha (1888-90), whom he reached after the latter's meeting with Stanley. He formed a company in London for exploring the gold fields of Rhodesia and visited Africa in 1889-1901 and in 1905.

**Peters, Madison Clinton** (1859-1918), American Baptist clergyman, was for 11 years pastor of the Bloomingdale Reformed Church in New York City. After serving in Brooklyn and Baltimore, he preached in the Park Theatre in Philadelphia. He was called to New York City in 1905, as pastor of the Church of the Epiphany, where he remained until 1907. His books are: *Justice to the Jew* (1899); *The Wit and Wisdom of the Talmud* (1900); *The Jew as a Patriot* (1901); *The Jews in America* (1905); *Abraham Lincoln's Religion* (1909); *All for America* (1917).

**Peters, Richard** (1744-1828), American jurist, was born in Philadelphia. In 1775 he commanded a company of provincial troops, and in 1776-81 was secretary of the Continental board of war. In 1782-3 he was a member of the Continental Congress. In 1791 he was speaker of the State Senate. In 1792 he became judge of the U. S. District Court for Pennsylvania.

**Peters, Samuel** (1735-1826), American clergyman, graduated from Yale, and in 1762 took charge of the Anglican churches in Hartford and Hebron. He lived in sumptuous style and was such an ardent Tory that he was twice visited by a mob and ultimately went to England. He returned to the United States in 1805. He is chiefly remembered for having, in a very untrustworthy *General History of Connecticut* (1781), started the story of the famous 'Blue Laws' of Connecticut.

**Petersburg**, city, Illinois, county seat of Menard co., on the Sangamon River. Nearby is the old Chautauqua Institute, across the river from the site of New Salem, the place where Abraham Lincoln, as a young man, kept store and was postmaster. In his honor there has been erected here a building known as the Lincoln Memorial; p. 2,586.

**Petersburg**, leading manufacturing city, Virginia, situated in, but independent of, Dinwiddie co., on the Appomattox River. The harbor is accessible to coastwise steamers. The educational institutions include Southern College, Virginia Normal and Industrial Institute for colored students, and St. Joseph's Academy. The chief items of export are peanuts, tobacco, and cotton. In the Revolution it was for a time the headquarters of Cornwallis, and it was bombarded by Lafayette. Heavy fight-



ing took place here in the Civil War; p. 30.631.

**Peterson, Frederick** (1859-1938), American neurologist, was born in Faribault, Minn. He was graduated in medicine from the University of Buffalo in 1887. In 1888-9 he was professor, University of Vermont; in 1890-95 at the Woman's Medical College of the New York Infirmary; and in 1892-1902 president of the board of managers of Craig Colony for Epileptics. In 1887 Dr. Peterson became instructor in Neurology in Columbia University, in 1901 was made clinical lecturer on psychiatry; and from 1903 to 1916 was clinical professor of psychiatry there. He was president of the New York State Commission in Lunacy (1901-06). Was joint author, with Dr. Church, of *Nervous and Mental Diseases* (1899; 9th ed. 1919). He wrote *American Text-Book of Legal Medicine and Toxicology* (1903; and ed. 1923); *A Song of the Latter Day* (1904); *Chinese Lyrics* (1916).

**Peterson, Sir William** (1856-1921), Canadian educator, was born in Edinburgh, Scotland. From 1879 to 1882 he was Assistant Professor of Humanity in the University of Edinburgh, and in 1882 was appointed Principal of University College, Dundee, which position he resigned in 1895 on being invited to become Principal of McGill University, Montreal.

**Peter's Pence**, a papal tax, which seems to have originated in Saxon England. Each family possessed of property worth thirty pence a year was to contribute one silver penny toward the support of the papal court. The practice was discontinued by Henry VIII. Voluntary contributions of the nature of Peter's pence have been revived by modern Roman Catholics.

**Peter the Hermit** (c. 1050-1115), monk and preacher of the first crusade, was born in Amiens. He is said by tradition to have been inspired by a vision in the Church of the Holy Sepulchre to undertake the mission of exhortation on which he traveled through Europe, urging upon all the rescue of Jerusalem from the Saracens. A great and disorderly company, whom he led toward the Holy Land, was destroyed in a battle at Nicæa (1096), after which Peter attached himself to the army of Godfrey of Bouillon. After his return from the crusade he founded an Augustinian monastery at Huy, near Liège.

**Petigru, James Louis** (1789-1863), American jurist, was born in Abbeville District, S. C. In 1819 he settled in Charleston. In 1822

he became attorney-general of the State. He opposed the movement which took the State out of the Union and brought on the Civil War. His last important work was the codification of the State laws.

**Petiole**, the stalk of a leaf. When developed in a leaf-like manner, so as practically to take the place of the leaf, it is called a phyllodium. Sometimes petioles are changed into tendrils.

**Pétion, Alexandre Sabes** (1770-1818), Haitian president, was born in Port-au-Prince. He fought with the French against Toussaint l'Ouverture, but in 1802 went over to the patriot party. In 1807 he was chosen president of the s. and w. of the island of Santo Domingo, and successfully defended his dominions against President Cristophe. In 1815 he was again chosen president, this time for life. He assisted Bolivar in his expedition to free Venezuela from Spain.

**Petition**, a request, or a remonstrance in the form of a request, formally presented to an authority. The right of petition is regarded as a fundamental part of every constitutional government. In the United States the right of petitioning the government is guaranteed to the citizens by the Constitution.

**Petition of Right**, in English history an act in the form of a petition from both Houses of Parliament, which received the assent of King Charles I. (1628).

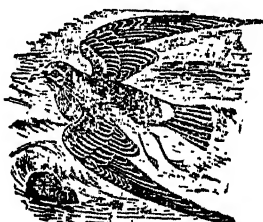
**Petőfi, Sandor (Alexander)** (1822-49), the greatest of Hungarian poets. He was two years in the army, made several attempts as an actor, and eventually received a hearing from Vörösmarty, then the leading poet of Hungary, under whose patronage he soon became known as a writer of lyrics of unrivalled beauty. He identified himself with the Hungarian revolutionists, and by his patriotic verse aroused great enthusiasm for the cause. He fell at the Battle of Schässburg. Petőfi's work marked an epoch in Hungarian literature, as the assertion of the more simple and romantic type of poetry against the old stereotyped and classical form. An English translation of his best verse was made by Sir John Bowring (1866).

**Petra**, ancient town, Arabia Petræa, capital first of the Idumæans and afterward of the Nabatæans. It stood in a narrow gorge midway between the Dead Sea and the northeastern extremity of the Red Sea; its importance was due to its position on this important trade route.

**Petrarch, or Petrarca, Francesco** (1304-74), Italian poet and humanist, was born in

Arezzo. The family eventually settled at Avignon and in 1326 Petrarch entered the priesthood. In 1327 he first saw Laura (probably the wife of Hugo de Sade), who was destined to inspire all his love poetry. His friendship with the great Roman family of the Colonna dates from this period. In 1333-7 he travelled in France, Belgium, and Germany, collecting MSS. of the classics. In 1340 he accepted the poet's laurel wreath from the Roman Senate, being crowned at Easter, 1341. On April 6, 1348, his Laura died; and though he went once again to Vaucluse (near Avignon), he left his beloved spot for good in 1353.

Petrarch may be considered as the earliest of the great humanists of the Renaissance. It is upon his Latin works that he based his hope of immortality. These works may be divided into poems, moral and religious prose works, historical prose works, minor writings, and letters. The twelve eclogues which compose the *Carmen Bucolicum* (1347-56) narrate, in pastoral guise, events of the poet's life and times. Among works testifying to Petrarch's mysticism and religious feeling the finest is perhaps the *Secretum* or *De Contemptu Mundi* (c. 1342), consisting of three dialogues between the author and St. Augustine. The *De Vita Solitaria* (1346-56) celebrates the hermits of all ages. The *Psalmi Pœnitentiales* were written to solace the poet's grief. The *Letters* (1326-74) are invaluable as a record of the author and his age, and are conspicuous for their literary merit. The rare and beautiful *Canzoniere* consist of 317 sonnets with canzoni, sestina, ballads, and madrigals, nearly all love poems, inspired by Laura. Consult English monographs on the poet by Reeve, Ward, Mills (1904), Hollway-Calthrop (1907), and Maud and Jerrold (1909).



Stormy Petrel.

**Petrel** (*Procellaria*), a genus of sea birds of the family which includes the albatrosses, shearwaters, fulmars, and petrels proper, and is allied to the gulls. The true petrels, of

which there are a number of widely distributed species, are long-winged birds of powerful flight. The best-known species is the *Stormy Petrel* (*P. pelagica*) or *Mother Carey's Chicken*, which is scarcely larger than a lark, and is the smallest web-footed bird known. The bird is essentially oceanic, and rarely comes on shore save at the breeding season, when it lays a single egg in a burrow, a rock crevice, or even on the bare ground. Because of its frequent appearance before or during stormy weather, and possibly also because of its blackness, it is regarded by sailors as a bird of evil omen.

**Petri, Laurentius** (1499-1573), Swedish reformer, studied under Luther at Wittenberg; was made first Protestant archbishop of Upsala. Along with his brother Olaus he succeeded in converting Sweden to the Reformed doctrines, and with him superintended the translation of the Bible into Swedish (1541).

**Petri, Olaus** (1493-1552), Swedish reformer, brother of Laurentius. He studied under Luther and Melancthon at Wittenberg. By Gustavus I. he was recalled to act as town clerk of Stockholm, to preach the doctrines of the Reformation, and in 1531 to become chancellor of the kingdom. Petri was the first to introduce the Reformation into Sweden. In 1526 he translated the New Testament into Swedish, and in 1541, with his brother Laurentius, the Old Testament. He also compiled the first Swedish hymn book.

**Petrie, William Matthew Flinders** (1853-1942), English Egyptologist, was born in Charlton, Kent. In 1880 he turned from British archæology to Egyptian research. From 1884 to 1886 he carried out excavations proving the presence of Greek settlements at Naucratis and Daphnæ, and in 1892 was appointed professor of Egyptology in University College, London. His principal discoveries have been inscriptions of the Israelite War at Thebes, Hyksos camp, the city of Onias, the palace of Memphis, Tarkhan, and the Treasure of Lahun. His numerous works include: *Pyramids and Temples of Gizeh* (1883); *History of Egypt* (new ed., 1903-25); *Royal Tombs of the Earliest Dynasties* (1901); *Revolutions of Civilization* (1911); *The Formation of the Alphabet* (1912); *Prehistoric Egypt* (1917); *Social Life in Egypt* (1923); *Religious Life in Egypt* (1924); *Tombs of the Courtiers* (1925); *Buttons and Scarabs* (1926); *Seventy Years in Archæology* (1931).

**Petrification.** Fossils are said to be petri-

fied when their minute structure is perfectly retained in some mineral substance. Fossil wood may be so impregnated with mineral substances that when sliced and examined under the microscope all the woody cells and vessels are clearly seen. See FOSSILS; FOSSIL FORESTS.

**Petrograd**, formerly **St. Petersburg**, changed in 1924 to **Leningrad** in honor of Lenine, the Soviet leader, city, Russia, in the government of the same name, capital of the former Russian Empire, and one of the largest and most important cities of Europe. It is situated at the head of the Gulf of Finland, at the mouth of the River Neva, in  $59^{\circ} 57' N.$  lat. and  $30^{\circ} 20' E.$  long.; 400 miles northwest of Moscow. It has railway connection with the head of the Volga and Moscow, with Poland and Western Europe, the Baltic provinces, and Finland. The main avenue of communication with the rest of the kingdom, however, is the Neva, which is connected by canals with the Upper Volga, and has thus become the mouth of the immense basin of Russia's chief river and its many tributaries. The Neva enters the city from the southeast, near the Alexander Nevski Monastery, flows n. for a short distance, then turns sharply to the w., and divides into three main branches. Five bridges cross the main stream, or Great Neva, of which the most important are the Alexander, Nicholas, and Troitzki (Trinity); and a series of semi-circular drainage canals empty into it on the eastern bank.

The climate is raw, damp, and exceedingly changeable. There is a short summer, with the hottest weather in July, and a long, damp winter, with an average temperature of  $15^{\circ} F.$  during January, the coldest month.

The main section of the city lies e. of the Neva, and has for its center the Old Admiralty, situated on the river bank. Three streets radiate from this in easterly, southeasterly, and southerly directions: the famous Nevski Prospect, the city's chief thoroughfare, and one of the finest streets in the world; the Gorokhovaya Ulitsa; and the Voznesenskii Prospect. Between the river and the Moika Canal lies the Admiralty Quarter. A spacious square planted with trees encloses on three sides the massive structure of the Admiralty Building, founded by Peter the Great in 1705, and rebuilt in stone in 1806-23. To the e. of it rise the magnificent mass of the Imperial Winter Palace, an immense quadrilateral of red stucco; the Hermitage, the semicircular buildings formerly housing the General Staff and containing the

military archives of Russia and the official quarters of the ministries of war, finance and foreign affairs; and the Alexander column, a shaft of red granite nearly a hundred ft. high. To the w. of the Admiralty Building is Peter Square, with Falconet's famous equestrian statue of Peter the Great, erected by Catherine II. (1729-96). To the s. is the great Cathedral of St. Isaac (1819-58), the most sumptuous of all orthodox and Slavic churches.

The island of Petrograd has the old fortress of St. Peter and St. Paul, facing the Winter Palace, and containing the Mint and the Cathedral of St. Peter and St. Paul, in which the emperors of Russia are buried. The great number and variety of its educational, scientific, literary, artistic, and technical institutions made Petrograd the intellectual center of the Empire. Before the collapse incident to the Revolution, Petrograd was the second industrial city in Russia. The great manufacturing establishments, situated chiefly on the outskirts, included metal works, iron foundries, sugar refineries, distilleries, breweries, ship and boat building yards, printing plants, and manufacturies. Vessels up to twenty-eight ft. draught can dock, unload, and receive cargo at the mouth of the Neva. The chief exports are agricultural and dairy products and timber. The population of Petrograd increased from 220,000 in 1800 to 1,870,000 in 1908. In 1941 the population was 3,191,000.

The territory at the mouth of the Neva was settled by the Swedes in 1300. The foundations of the fortress of St. Peter and St. Paul, the nucleus of St. Petersburg, were laid in 1703, and in 1712 the city was formally created the imperial capital. After destructive fires in 1736 and 1738, St. Petersburg was reconstructed with the Winter Palace as its center, and under Catherine II. (1729-96) became one of the leading capitals of Europe. The marshes were drained by Alexander I. (1801-25), and railroads were constructed to join the capital with other parts of the Empire by Nicholas I. (1825-55). The city was the center of the Russian political crisis in 1905 (see RUSSIA, *History*). Since then civic improvement has been rapid. Shortly after the outbreak of the Great War of Europe, in 1914, the name of St. Petersburg, because of its German origin, was changed to Petrograd. In March 1924 it became Leningrad, in honor of Nikolai Lenine.

**Petrography.** See **Petrology.**

**Petrol**, the name applied in Great Britain

to one of the distillates of petroleum; practically the same as gasoline. See PETROLEUM.

**Petrolatum**, or **Petroleum Jelly**, an amber-colored, translucent, jelly-like substance, which is obtained by distilling off the more volatile portions of petroleum, and purifying the residue by filtration. It is largely used as a lubricant, as a protection for polished iron and metals, and in pharmacy as an unguent and a base for ointments. It is sometimes known as Vaseline, though this term is a trade-mark.

Among the first historic records of petroleum is that of its use on the walls of Babylon and Nineveh about 2,000 B.C., and for ages seepages of crude oil have been drawn on and used by the people of Egypt, Mesopotamia, India, and China. For many centuries hand-dug wells and pits were used for the collection of petroleum, while the modern method of cable tool drilling, now commonly used in oil fields, is believed to have originated with the Chinese centuries ago. But the modern industry really began when the Drake



*Nevski Prospect, Leningrad.*

**Petroleum**, a liquid consisting of many hydrocarbons dissolved in each other, whose aggregate composition varies greatly. It is probably produced in part by the slow decomposition of both animal and vegetable matter, deeply buried in sedimentary rocks; and in part by the fermentation and decay of organic matter at the earth's surface, the resulting oil being deposited contemporaneously with the rocks in which it is preserved. Petroleum is present, in at least minute quantities, in nearly all of the unaltered sedimentary rocks from Lower Silurian to Recent in age. The commercially important deposits occur as concentrations in porous reservoir rocks, such as sandstone or limestone, sealed by overlying less pervious strata.

well was drilled near Titusville, Pa., in August, 1859. Besides the United States, Roumania, Canada, Russia, and Galicia became important producers at an early date, and the later important additions to the list include Mexico, Persia and Venezuela. The industry is now practically world wide.

Approximately two-thirds of the world's current supply of oil is obtained from the United States. Russia ranks next in importance and Venezuela third. In the United States, Texas leads in output, followed by Oklahoma and California.

Two general methods of drilling are in common use in the United States, the standard or cable-tool method and the rotary method. Rotary tools have the advantage

over cable tools in speed, in reduced casing costs, in drilling soft cavey formations, and in confining the contents of each stratum within that formation. The greatest objection to the rotary system is the impossibility of recognizing with certainty the various formations penetrated and their contents. This can be remedied by coring at the points in question, but is expensive. The cable tool system is more suitable for drilling new territory where oil, gas and water horizons are unknown and for drilling hard rock which rotary tools will not penetrate.

The pressure of the accompanying natural gas often forces oil from wells in their early life, such wells being known as gushers or flowing wells. Later, as the gas pressure is reduced, oil from the wells of the United States and some other countries is lifted by specially designed reciprocating plunger pumps. A central power plant may pump as many as thirty or forty wells, or a single plant may be provided at each well. In some districts oil is bailed from the hole with the ordinary bailer; it is also swabbed from the hole. A swab both lifts oil and reduces the pressure in the well and thus induces flowing. The air-lift or gas-lift method of pumping has been known for many years but did not come into general use until 1926. Another factor in production methods is the maintenance of the pressure in the producing strata by returning to them the gas that is recovered from the well.

Crude petroleum varies in color from very light yellow to black, frequently with a green fluorescence when viewed by reflected light. The viscosity varies over a wide range, some oils being little more viscous than kerosene, while others are practically solid at ordinary temperatures. The petroleum of the United States are frequently classified as paraffin base, naphthene (or asphaltic) base, and intermediate base crudes. The paraffin base crudes are those containing relatively high percentages of aliphatic hydrocarbons. Naphthene base crudes contain relatively high percentages of cyclic hydrocarbons. Intermediate base crudes, as the name indicates, are intermediate in properties, between the two former classes. The Pennsylvania petroleum are typical paraffin base crudes; California and Gulf petroleum are typical naphthene base crudes. Russian petroleum contains considerable proportions of naphthenes, whereas petroleum from the East Indies frequently contains notable percentages of aromatic hydrocarbons.

In the process of conversion into useful products, crude petroleum is usually subjected to fractional distillation, each fraction being further purified by distillation and frequently by chemical treatment. The first fraction recovered is known technically as 'crude naphtha' or 'crude benzine,' which must not be confused with benzene, or benzol derived from coal tar. This fraction is usually redistilled in a steam still and the final product is used as gasoline in internal combustion engines. The same crude naphtha fraction can also be refined to produce naphtha, which is used as a solvent in the arts.

The second fraction recovered from the crude oil is known as 'kerosene distillate' or 'burning oil' distillate. This is steam stillled to remove naphtha and purified by successive treatments with sulphuric acid and caustic soda solution. Several different grades of kerosene are marketed, the highest quality is water-white in color. Other grades of kerosene are used for fuel in stoves and to some extent as a solvent and for export. The fraction of crude oil distilling at a temperature just above kerosene is known as 'gas oil' and is used for enriching water-gas. In recent years it has also served as a base material for the manufacture of gasoline by the so-called 'cracking' processes. A third use is as fuel for Diesel and semi-Diesel engines and in oil-burners for domestic or commercial heating.

The fourth fraction derived from the crude oil is known as 'wax distillate' or 'lubricating oil distillate.' It contains most of the paraffin wax originally carried by the crude. Paraffin wax is used for water-proofing paper and wooden containers for various products, also for manufacturing candles, coating matches, etc. The oil drained from the wax in the filter presses and sweating pans is refined by distillation, chemical treatment, and yields a large number of lubricating oils, varying from the light-colored, non-viscous oil used for lubricating typewriters and clocks to the viscous oils used in internal combustion engines and for lubricating heavy machinery.

Oil is usually transported to the refinery and, in some cases, to the seaboard by pipe line; it is then loaded into tank steamers, which carry it to refineries at distant ports. Refined products are carried principally by tank cars while trans-oceanic shipments are made in tank steamers built for the purpose. The oil pipe line has become a fundamental part of the oil industry and is by far the most satisfactory method of transporting petroleum on land. The net-work of pipe

lines in the United States has become so complete that it is possible to pump oil produced in the central part of Texas to the refineries at the Atlantic seaboard, a distance of over 2,500 miles.

Since oil is a prime requisite of belligerents, during World War II attention was focused on location and production of the world's oil fields. In the U. S., in 1942, the petroleum industry was organized for war effort in co-operation with the petroleum co-ordinator, Harold L. Ickes.

**Petrology, Petrography, or Lithology**, the science of rocks, a branch of geology which has many relations with the cognate science of mineralogy. It is concerned principally with the composition, structure, interpretation, and classification of rock. Much can be learned about rocks by simple naked-eye inspection, or with the aid of a pocket lens. For the examination of the finer grained rocks, and of the mineral properties which characterize the minute crystals and fragments of which most rocks are composed, resource must be had to more refined methods of investigation. The rock may be chemically analyzed, and a knowledge of its bulk composition never fails to indicate in which category it is to be placed, provided that its principal mineral components and its macroscopic characters are already known. But an even more potent auxiliary is the microscope. The great rock groups, as employed in most works on petrology, are sedimentary rocks, igneous rocks, metamorphic rocks.

Sedimentary rocks consist of broken, rounded fragments (e.g., the conglomerates), or of small, worn sand grains (e.g., sandstones, grits, arkoses), or of the finest muddy and clayey silts (clay, shale, marls). As a group they have certain well-defined characters. They are mostly divided up into thin sheets or beds, which have parallel upper and under surfaces; they consist of broken *débris* of pre-existing rocks, which, having accumulated in seas, lakes and upon land, have been subsequently subjected to pressure and pressed into solid form.

Igneous rocks form another well defined group, produced as a result of volcanic and eruptive forces. Omitting the sedimentary and clastic ash beds, they are crystalline, and have at one time been in a state of fusion, from which they have cooled more or less slowly. Their structure and the minerals of which they are composed depend mainly on two factors—*vis.*, the chemical composition of the magma or molten mass from which

they proceeded, and the physical conditions under which they solidified.

Metamorphic rocks, of which the best known are the schists and gneisses, very generally have a banded or foliated appearance and a crystalline structure. See **ROCKS**. Special works on the subject are Rutley's *Study of Rocks*; Harker's *Petrology for Students* (1908); Iddings' *Igneous Rocks* (1909).

**Petronel**, an ancient and clumsy form of pistol.

**Petronius, Gaius** (d. c. 66 A.D.), surnamed **Arbiter**, from his supposed identity with the Petronius whom Tacitus calls 'arbiter elegantiae' at the court of Nero, is generally believed to be the author of the satirical romance or collection of satires of which the 15th and 16th books have come down to us, though in a fragmentary state. The *Satyricon* of Petronius, of which the *Cena Trimalchionis* is the chief piece, gives a vivid picture of the first century on its seamier side, and in style touches the high-water mark of silver-age Latinity.

**Petropavlovsk**, town, in Autonomous Kazak Socialist Soviet Republic, 175 m. w. of Omsk; p. 31,000.

**Petropolis**, town and summer residence, state of Rio de Janeiro, Brazil; 28 miles n. of Rio de Janeiro. It is beautifully situated in the valley of the Organ Mountains, at an elevation of 2,300 ft. It was originally a colony of Germans (1845), and superseded Nitheroy as capital of the state of Rio de Janeiro from 1893 to 1903. Beer, cheese, cigars, and cotton goods are manufactured; p. 30,000.

**Petrovsk**, town of Soviet Russia; 60 m. northwest of Saratov city. It has tanneries, distilleries, breweries, oil and brick works; p. 19,000.

**Petrozavodsk**, the capital of the Karelian Republic of Soviet Russia; 190 miles northeast of St. Petersburg, on the western shore of Lake Onega. It manufactures iron and copper ware; p. 27,000.

**Pettenkofer, Max von** (1818-1901), German chemist, was born near Neuberg, Bavaria. He made many valuable contributions to science on subjects as various as gold refining, gas making, ventilation, clothing, the influence of soils on health, epidemics, and hygiene generally. In particular, his researches laid the foundation of the science of experimental hygiene. He founded (1883) and edited the *Archiv für Hygiene*. He also made notable researches on cholera.

**Petty Officers, Naval**, are comparable in

rank with non-commissioned officers of the army. They include all grades below those of warrant officer, and above those of seaman, fireman, etc. In the United States Navy, petty officers are of four grades—chief petty officers, and petty officers of the first, second, and third class.

**Petunia**, a genus of herbaceous plants belonging to the order Solanaceæ, mostly South American. They bear showy flowers with funnel-shaped corollas of every imaginable shade and are easily cultivated in sunny, warm places.

**Pewee**. A name in the United States for several small flycatchers of the family Tyrannidæ, all of which are prevaillingly olive-green in color. There are six or eight species, of which the most familiar are the bridge, wood, and least pewees.

**Pews**, permanent church seats, alluded to in a canon of Exeter (1281) and in *Piers Plowman*. Originally a pew was a box enclosure entered through a door and reserved for a specific family, but the term now signifies a church seat with a back.

**Pewter**, an alloy, of 80 per cent. tin with 20 per cent. lead. It is a soft metal, somewhat darker and duller than tin in appearance. Pewter was formerly much employed for making plates and drinking cups, and has recently been used again largely for the manufacture of ornamental and decorative articles.

**Peyote Worship**, a religious practice among the Indians in Mexico and the southwestern part of the United States in which several species of plants are eaten to produce a state of excitement. The name seems to be of Aztec origin.

**Pforzheim**, tn., grand-duchy of Baden, Germany, 22 miles by rail E.S.E. of Ettlingen, on n. slopes of Black Forest. It manufactures gold and silver ornaments, chemicals, paper, and machinery; p. 79,000.

**Phæacians**, a people mentioned in Homer's *Odyssey* as inhabiting an island, Scheria. They were a luxurious race, and skilled sailors; their king was Alcinous. *Odysseus* was wrecked on their coast, and hospitably received by the king.

**Phædon**, or **Phædo**, Greek philosopher, a native of Elis, after whom Plato's dialogue describing Socrates's last hours is called. He founded a school of philosophy at Elis, but his writings are lost.

**Phædra**, in ancient Greek mythology, a daughter of Minos by Pasiphaë, and the wife of Theseus. Theseus had a son, Hip-

polytus, by a former marriage, with whom Phædra fell in love; but Phædra, seeing her love was hopeless, killed herself. This is Euripides's version of the story, finely dramatized in Euripides's *Hippolytus*, which Racine has copied in his *Phèdre*.

**Phædrus**. An Athenian and friend of Plato, who called one of his dialogues after him, and also introduced him as a character in the *Symposium* (see Plato's *Phædrus*). He wrote ninety-seven fables in Latin iambic verse. The best fables are those which are closest to Æsop, whom Phædrus professes to follow.

**Phaëthon**, an ancient Greek name for the sun-god, but more often employed of a son of the sun-god, Helios. When a youth he started to drive the chariot of the sun, but Zeus killed Phaëthon with a thunderbolt to check his career, and he fell into the river Eridanus (the Po).

**Phaëton**, an open four-wheeled pleasure carriage drawn by one or two horses; named after Phaëthon, the sun-god.

**Phagocytes**, or **Eating-cells**, a name given by Metschnikoff to the leucocytes, or white blood-corpuscles. See **Blood**.

**Phalanx**, the name applied to the ordinary formation adopted by Greek heavy-armed infantry. The Macedonian phalanx was an improvement on the Greek formation, in that the men stood in a rather more open order, sixteen deep, armed with spears twenty-one ft. long. Philip and Alexander employed the phalanx of infantry to engage the enemy's attention, while they decided their battles by their cavalry.

**Phalaris**, a genus of grasses, bearing their inflorescences in spike-like panicles. The annual canary grass, *P. canariensis*, is also sometimes cultivated. Its seed is sold as food for singing-birds.

**Phalaris**, tyrant of the Greek town Acragas (Agrigentum), in Sicily; reigned about 560 B.C. for some ten or fifteen years. He is said to have roasted men alive in a brazen bull.

**Phalarope** (*Phalaropus*), a genus of limicoline birds belonging to the family Phalaropodidæ. The three species may be recognized by the fact that the three anterior toes are furnished with lobe-like expansions recalling those of the coot.

**Phallus** and **Phallic Worship**, one of the several phases of the worship of the reproductive powers of nature—a worship common to most early or primitive races. As a natural consequence, the symbols of sex, more or less crudely represented, figure prominent-

ly in the rites and ceremonies. Phallic worship is not yet extinct in Japan, and in India, under the name of *Linga Puja*, this worship is still practised by the followers of Siva and Vishnu.

**Pharaoh**, title of the kings of Egypt, first used under the fourth dynasty, and common at a considerably later time. Its actual meaning is 'great house.' See EGYPT.

**Pharisees**, a religious party in Judaism, whose general aim was to separate the Jews from all neighboring nations. Historically they represent the reaction against the worldly aspirations of the Hasmonæan dynasty, and first became prominent under John Hyrcanus (135-105 B.C.). The special means by which they strove to effect their object was insistence on the eternal validity of the law and of its traditional interpretation. They became a separate party within the nation, insolent with the sense of superior piety as being the only men who kept the law. Yet they preserved the Jewish religion at a critical time.

**Pharmacopœia**, an official catalogue of drugs and medical remedies, giving their doses, their characteristics, and the tests for determining their purity. The first pharmacopœia was probably that of Nuremberg, published by Valerius Cordus in 1542. The first volume of this sort published in the U. S. appeared in Philadelphia in 1778, and was compiled for the army. The New York County and the New York Medical Societies initiated the method of holding a convention of delegates from medical societies and colleges, the first being convened at Washington, in 1820. A similar convention is held once in ten years.

**Pharmacy**, the art of preparing drugs for use. The pharmaceutical chemist must study the preparation and compounding of drugs. Within his province also comes the dispensing of medicines according to physicians' prescriptions.

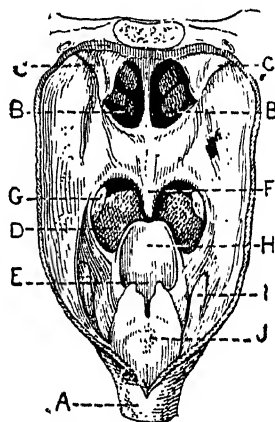
**Pharnaces**, a son of Mithridates, king of Pontus. In 47 he attempted to regain his father's kingdom of Pontus, but in the same year was defeated by Julius Cæsar in the battle of Zela, which occasioned the famous dispatch, *Veni, vidi, vici*.

**Pharos**, a small island off the n. coast of Egypt, which Alexander, when he founded Alexandria, caused to be joined to the coast by a mole nearly a mile long. On this island Ptolemy II. built a lofty tower, through the upper windows of which the light of torches or fires was shown to guide vessels into har-

bor; this was the first lighthouse erected.

**Pharsalus**, t.n., Thessaly, ancient Greece. w. of riv. Enipeus. In its neighborhood Cæsar defeated Pompey in 48 B.C., and thus became master of the Roman empire. The battle is commonly called the battle of Pharsalia, the name of the territory of Pharsalus.

**Pharynx**, the funnel-shaped pouch lying above the gullet or œsophagus, is of similar anatomical structure to the gullet, but has seven openings into it. These are the two posterior nostrils, the two Eustachian tubes, the large opening into the mouth, the laryngeal slit, and inferiorly the opening into the œsophagus, which is continuous with it below.



*The Pharynx opened Posteriorly.*

A, Œsophagus; B, posterior portion of nostrils; C, Eustachian tube; D, opening to mouth (base of tongue); E, superior opening of larynx; F, uvula; G, tonsil; H, epiglottis; I, thyroid cartilage; J, posterior surface of larynx.

**Phascologale**, a genus of Australian and New Guinean marsupials, whose members are arboreal and insectivorous, and never exceed the size of a rat.

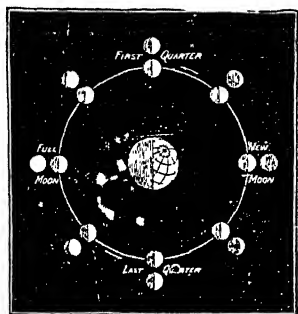
**Phases**, the varying effects of illumination shown by the moon and some of the planets consequent upon their changes of position relative to the sun and earth. Galileo's discovery of the phases of Venus in 1610 virtually demonstrated the heliocentric theory.

**Ph.D.**, Doctor of Philosophy.

**Pheasant**. The original pheasant of western Europe, familiar in accounts of shooting on English and Irish estates, was *Phasianus*



*colchicus*. At the close of the 18th century, a Chinese species, the ring-necked pheasant (*P. torquatus*), was introduced, and has interbred very freely with the original species, so that purebred pheasants are now rare. Apart from the beautiful plumage, especially of the male, pheasants are characterized by the long and wedge-shaped tail, the spurred legs, and the absence of feathers on the sides of the head. Of other genera special mention may



*Phases of the Moon.*

be made of *Chrysolophus*, to which belongs the beautiful golden pheasant (*C. pictus*), a native of wooded mountain regions in China and Tibet; and Amherst's pheasant (*C. amherstiae*), of almost similar distribution.

**Phelan, James Duval** (1861-1930), American public official, was born in San Francisco. He was graduated from St. Ignatius College; studied law in the University of California; was commissioner and vice president of the World's Columbian Exposition at Chicago in 1893; and was mayor of his native town during 1896-1902. At the time of the great San Francisco earthquake, in 1906, he was chairman of the citizens' committee in charge of the relief work. He was United States Senator, 1915-21.

**Phelan, Richard** (1825-1904), American Roman Catholic prelate, was born near Ballyraggatt, County Kilkenny, Ireland. From 1858 to 1868 he was priest at Freeport, Pa., and then became priest of St. Peter's at Allegheny, where he built a church costing \$150,000. In 1881 he was appointed administrator of the dioceses of Pittsburgh and Allegheny, and afterward vicar-general. In 1885 he was consecrated coadjutor-bishop of Pittsburgh, becoming bishop in 1889.

**Phelps, John Wolcott** (1813-85), American soldier, was born in Guildford, Vt. He served in the second Seminole War, and in the Mexican War. He resigned from the army

in 1859 and devoted much of his time to advancing the cause of Abolition, but when the War of the Rebellion came he re-entered the army as a brigadier general of volunteers. He was declared an outlaw by the Rebel government for having 'organized and armed negro slaves for military service against their masters.' In 1880 he was the candidate of the American Party for President.

**Phelps, William Lyon** (1865-1943), American educator, author and critic, was born in New Haven, Conn. After 1901 he was professor of English literature at Yale, and was notably successful as a teacher and lecturer. His published works include *The Beginnings of the English Romantic Movement* (1893); *As I Like It* (1923); *Adventures and Confessions* (1926); *Happiness* (1926); *Essays on Things* (1930).

**Phenacetin**, trade name for *acetphenetidinum* (U.S.P.)  $C_6H_4(OC_2H_5)NHCH_2CO$ , the acetamino-derivative of phenetole. It is employed in medicine as an antipyretic and for the relief of pain, being the least likely of this type of drug to have a poisonous effect.

**Phenol.** See **Carbolic Acid**.

**Phenolphthalein** belongs to the class of triphenylmethane dyes, formed when phthalic acid is heated with phenol in the presence of a dehydrating agent. It is largely used as an indicator in acidimetry, in the form of an alcoholic solution. For a number of years it has been used extensively as a laxative, which is sold under the trade name *phenolax*. The latter is also sold incorporated in chewing gum.

**Phenomenalism**, the philosophical doctrine derived from Kant, that we can know only phenomena. But in more popular usage it means simply an assertion of the limitation of human knowledge to the objects of natural science, and is thus interchanged with such terms as naturalism, agnosticism, and positivism.

**Phenomenon** signifies strictly that which appears, as distinguished from, or opposed to, that which really exists, and was a term long used in philosophy to denote the world of sense as contrasted with the higher or more real world known by reason. Phenomenon is now freely used to mean simply any fact of observation.

**Phi Beta Kappa**, the oldest of the American Greek letter societies, founded at William and Mary College in 1776 as a social and literary society. Chapters were established at Yale in 1780, at Harvard in 1781, at Dartmouth in 1787, and there are now 114

chapters. Membership in the fraternity is given to honor men of the class and is sometimes conferred in after years upon scholars of distinction. Women were not admitted until 1875, and Vassar College was the first woman's college to institute a chapter (1898). The symbol of the fraternity is a gold panel with the initials Φ Β Κ representing *Φιλοσοφία Βίου Κυβερνήτης*, Philosophy the Guide of Life.

**Phidias** (c. 490-432 B.C.), the most famous sculptor of ancient Greece was born in Attica. From 444 to 438 he was engaged in the superintendence of the building of the Parthenon at Athens, and the production of the statue of Athena for that temple. By the general consent of antiquity Phidias was the greatest of Greek sculptors. His chief characteristics were largeness, dignity, magnificence, and a fine spirit of repose. His principal works were what are called chryselephantine statues—that is, there was an inner core of wood or stone, which was covered with plates of polished ivory for the parts representing flesh, while gold was used for the drapery. Only the remains of the external sculptures of the Parthenon, especially the frieze (of which the Elgin marbles are a part), survive to give us an idea of Phidias' skill; and it is not certain that these are actually his own work.

**Phigalia**, town, in Southwestern Arcadia, ancient Greece, celebrated for its temple of Apollo (at Bassæ), probably built about 430 B.C., after the design of Ictinus, the architect of the Parthenon. The temple is of fine gray limestone and white marble, and next to the Theseion at Athens, is the most perfect architectural ruin in all Greece. The sculptures of the frieze—the famous Phigalian marbles—were discovered in 1811, were bought by the British government for £15,000, and placed in the British Museum in 1814.

**Philadelphia**, the metropolis of Pennsylvania, third city of the United States in population, is situated in the southeastern corner of the State, at the confluence of the Delaware and Schuylkill Rivers, about 120 miles from the sea; p. 1,931,334. It occupies a central position on the North Atlantic seaboard, 90 miles by rail from New York, 96 from Baltimore, and 132 from Washington, and this, with its proximity to the coal and iron deposits of the State and its unexcelled rail and water communications, has given it great commercial and industrial importance. Philadelphia has a water frontage of 34 miles, 20 miles on the Delaware and 14 on the Schuyl-

kill. Along the rivers, in and just below the city, are situated a number of the largest oil refineries, and large shipments of oil for the foreign trade, as well as of grain, are made by way of the Schuylkill and Delaware. Philadelphia has a somewhat warmer climate than the rest of the State. During the summer months the heat is sometimes excessive, but the winters are generally mild.

The city does not occupy a level plain, although the levelling processes of municipal engineering have done much to eliminate the original topography. The streets in the old city proper rise with a steep grade from the river to Front Street, and recall the bluff which the founders of the city noted when selecting the site. The center of the city proper, that is, several blocks n. and s. of Market Street and w. of the Delaware, is largely given over to the wholesale and shipping trade of the community. West of this is the fashionable retail shopping section, centering on Walnut, Chestnut, Market, and Arch Streets and the connecting numbered thoroughfares.

The ideal of William Penn to make of his newly founded settlement 'a green country town' has never been wholly departed from. Trees are in the streets, and the small parks movement has in Philadelphia a strenuous advocate. Penn's five open 'squares,' Independence, Franklin, Logan, Washington, and Rittenhouse, at the corners and the center have been multiplied in all directions, until today there are upwards of 140 parks and playgrounds, besides the city's chief pride, Fairmount Park. Fairmount Park has long been the approved site for various public memorials and monuments, chief among which is the Washington Monument. Other memorials in the park perpetuate the memory of Grant, Meade, Lincoln, and other prominent men. There are also preserved on the site of the Centennial Exhibition of 1876 two buildings used in that national celebration. Memorial Hall shelters the collection of the Pennsylvania Museum and School of Industrial Art, and the Wiltach collection, which contains notable examples of modern and Renaissance paintings. Horticultural Hall contains a fine display of exotic plants. Other places of interest in the park are the aquarium, zoological gardens, William Penn cottage and Grant cottage.

The \$25,000,000 City Hall, a white marble structure in the modern French Renaissance style, with a 548 ft. tower, is the landmark for the center of the city. On the n. is the Masonic Temple, a notable example of pure

Norman architecture. The original building of Girard College is one of the finest specimens of pure Greek architecture in the country. Independence Hall, at Sixth and Chestnut Streets, is a stately and dignified relic of Revolutionary days. In it the Declaration of Independence and the Constitution were signed, and it houses the Liberty Bell. This and Carpenters' Hall, where the first Continental Congress held its sessions; Christ Church, built in 1727; the Betsy Ross house, in which the first American flag was made; Franklin's tomb at Fifth and Arch Streets, and the many beautiful Colonial residences which are still preserved in Germantown, are among the city's most cherished historic treasures. Modern structures are the new Custom House; the Post Office and Pennsylvania Railroad Depot, both in West Philadelphia; and the U. S. Mint, at Seventeenth and Spring Garden Streets, a handsome building of granite erected in 1901 at a cost of \$2,500,000. Notable buildings are the Packard, Fidelity, Girard Trust, Widener, Wanamaker Store, Bellevue-Stratford Hotel, Curtis—the home of the *Saturday Evening Post*, *Ladies' Home Journal* and *Country Gentleman*—Philadelphia Saving Fund Society and the *Inquirer* buildings. In West Philadelphia is the imposing group of buildings of the University of Pennsylvania, including a library, dormitories, and lecture halls.

The oldest church in the city is the Old Swedes, a Protestant Episcopal church at the corner of Front and Christian Streets. The edifice now standing was begun May 28, 1698, and dedicated July 2, 1700. Other historic churches are Christ Church, the present building occupying the site of one erected in 1695, in which Presidents Washington and Adams worshipped, and Benjamin Franklin had a pew. Many characteristics of the Quaker founders of Philadelphia still survive in the city. One of them is the simplicity and uniformity of the street plans. Another is the uniformity in the style of dwellings. For many years block after block was built in one design—red brick with white marble trimmings. The more elaborate dwellings are found in the suburbs and along the main line of the Pennsylvania Railroad and in Germantown, Chestnut Hill, York Road and in the Whitmarsh district.

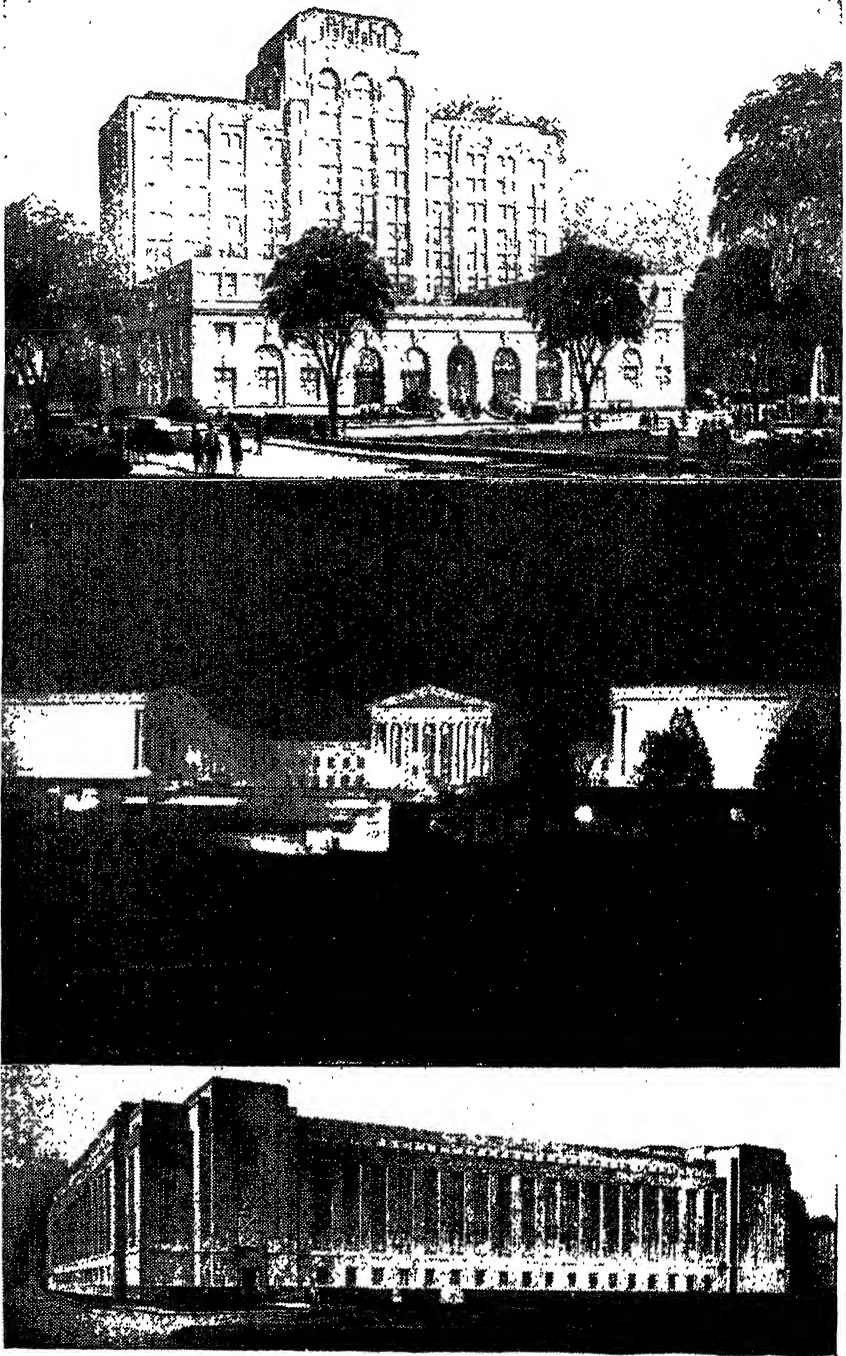
The principal clubs are the Racquet, Union League, Philadelphia, Rittenhouse, University, Manufacturers', Mercantile, Columbia, Penn (literary), the Lawyers', Poor Richard, Acorn, and the Art Club. Philadelphia is well

supplied with places of amusement, and the Walnut, the oldest theatre in the country, is still in service. Music lovers have for their especial needs the Academy of Music, a large auditorium which is the home of grand opera, and is employed for the weekly symphony concerts of the Philadelphia Orchestra and for occasions which call for accommodations for some 3,000 auditors.

Philadelphia is the seat of the University of Pennsylvania, Temple University, and of Girard College, founded by the will of Stephen Girard, for the support and education of poor white male orphans between the ages of six and ten years. The fine and applied arts are represented by the schools of the Pennsylvania Academy of the Fine Arts, the oldest art institution in the country, founded in 1805; the School of Design for Women; the Pennsylvania Museum School of Industrial Art (1876); the Drexel Institute of Art and Industry, endowed by the late Anthony J. Drexel in 1892; and the Williamson School of the Mechanical Trades. The city also boasts an excellent art museum; the Rodin museum; and the Curtis Institute of Music. Dropsie College for Hebrew and Cognate Learning was founded and generously endowed by Moses A. Dropsie in 1907. Bryn Mawr for women, Swarthmore, Haverford and Villanova Colleges are also within a few miles of Philadelphia.

Closely allied with the city's educational institutions are the Franklin Institute (1824); the Academy of Natural Sciences (1812), the oldest of its kind in the country; the American Philosophical Society (1743), the oldest learned society in the United States, founded by Franklin; the Zoological Society (1859); and the Pennsylvania Historical Society (1824). The library company of Philadelphia was founded by Franklin in 1731. The Free Library was founded in 1891 and has more than 1,000,000 volumes, housed in a building of Greek architecture on the Parkway. Philadelphia is celebrated for the excellence of its medical schools. These include the medical department of the University of Pennsylvania, the Jefferson Medical College (1826), Woman's Medical College (1850), Hahnemann College, Medico-Chirurgical College, and allied hospitals. The Henry Phipps Institute for the Study of Tuberculosis was founded in 1903.

Philadelphia has two morning and two afternoon daily newspapers. These are the *Inquirer* and *Record*, in the morning field and the *Evening Bulletin* and *Eve-*



*Philadelphia.*

Upper, Board of Education, Administration Building; Middle, Art Museum; Lower, New Post Office.

ning *Public Ledger*, in the afternoon.

Philadelphia has long been and continues to be famous as a manufacturing city. It ranks high for the amount of capital invested in its industries, for its number of skilled factory workers and for the value of its manufactured output. Sugar refining, the manufactures of textiles, steel works, and locomotive and car building are the leading industries. The Baldwin Locomotive Works, Disston Saw Works, J. B. Stetson Hat Plant, and Brill's Car Works rank first in their respective lines in the world.

Three great railroads have direct entrance to Philadelphia: the Pennsylvania, the Phila-

Safety; Public Works; Public Health; Public Welfare; Wharves, Docks, and Ferries; City Transit; Supplies; City Architect; City Solicitor; City Treasurer; City Controller; Law Department; Civil Service Commission; Register of Wills; Recorder of Deeds; Coroner; Sheriff; and Receiver of Taxes. The mayor appoints the heads of these departments with the exception of the Civil Service Commissioner, who is chosen by the Council, and the Receiver of Taxes, City Treasurer, and City Controller, who are elected by popular vote. The charter provides also for a budget to be prepared by the mayor and submitted to the Council,



*The Great Temple of Isis, Philæ.*

delphia and Reading, and the Baltimore and Ohio. The Delaware River is deep enough for the largest ocean vessels, and the Schuylkill River admits vessels of 22 ft. draught. According to data assembled by the U. S. Bureau of Foreign and Domestic Commerce, Philadelphia ranks third among American seaports, being preceded by only New York and Baltimore; and eleventh as a world port. The municipal airport is in Southwest Philadelphia. In 1939 a new municipal airport at Hog Island was completed.

In 1919 the city charter of Philadelphia was revised and many important changes were made. The government is vested in a mayor who is elected for four years and may not succeed himself, and a City Council, consisting of a single chamber of 22 members who are elected for four years and may hold no other public office.

The executive departments are: Public

which must then pass an ordinance setting forth the financial program for the year, and fixing a tax rate which, with other receipts, will meet the required expenditures. A provision empowering the city to repair and clean its own streets, and to dispose of ashes and of garbage, replaces the costly practice of having that work done by contract restricted to a single year.

Although the first colonists on the site of the present city of Philadelphia were a party of Swedes who came over in 1636, the permanent settlement dates from 1681, when William Penn was made, by royal charter, full proprietor of the province named after him—Pennsylvania. Penn immediately dispatched William Markham, as governor, with a small number of Quaker colonists, to take possession. Naming the new settlement Philadelphia, 'the city of brotherly love,' Penn lost no time in making friends with the Indians

in a manner consistent with his doctrines and his peaceful spirit. The treaty which he concluded with the Indians in 1683, under the great elm-tree at Kensington, spared Philadelphia the horrors of aboriginal warfare and allowed peaceful opportunities for progress, while the established legal principle of toleration for all religious sects stimulated immigration to the new settlement. A number of Germans, at Penn's invitation, landed in 1683 and settled on the site of what is now Germantown, long since an integral part of Philadelphia. Philadelphia took rank as a city in 1701, when Penn chartered it, and until 1799 remained the capital of Pennsylvania.

Penn's spirit of justice and toleration was emulated by Benjamin Franklin, who, after its founder, wielded the greatest influence over the city's life and activity. Franklin's *Pennsylvania Gazette*, issued in 1729, his *Pennsylvania Journal and Weekly Advertiser*, started in 1742, and his *Poor Richard's Almanack* and *Plain Truth* were powerful moulders of public opinion. Philadelphia was a strong factor against British impositions, and when the Revolution began it was the seat of many important events. The first Continental Congress met in Carpenters' Hall, September 5, 1774. The second Congress assembled in the State House on May 10, 1775. There, on June 15, Washington was appointed commander-in-chief of the army. On July 4, 1776, Congress adopted the Declaration of Independence in the State House to the pealing of the old Liberty Bell. From September 27, 1777, to June 18, 1778, the British held Philadelphia while the Continental army was encamped in the recesses of Valley Forge, to which it had retired after the battle of Germantown on October 4, 1777. Philadelphia at this time was reputed to be the finest city in America. The Constitution of the United States was adopted there on September 17, 1787, and from 1790 to 1800 the city was the seat of the Federal Government. The first Abolition Convention met here, Jan. 1, 1794.

In the last few decades of the nineteenth century some of Philadelphia's notable historic events were celebrated: by the Centennial Exposition in 1876 in commemoration of the declaration of American independence; the bi-centennial in 1882 to commemorate the landing of William Penn; and the centennial of the signing of the Constitution in 1887. In 1908 the 250th anniversary of the founding of the city was celebrated. The Sesqui-centennial Exposition was held in Philadelphia from May 31 to November 30, 1926.

**Philadelphus**, a genus of hardy shrubs belonging to the order Saxifragaceæ. *P. coronarius*, the common mock orange or 'Syringa,' bears racemes of strongly-scented white flowers in May.

**Philæ**, a small island in the River Nile, 5 miles by rail s. of Assuan. It is about 500 yards in length and 160 yards in breadth and is noted for its many temples, built mostly by the Ptolemies and the Roman emperors. The oldest building on the island is the vestibule of the temple of Nektanebos, built by him about 350 B.C. and dedicated to his 'mother Isis.' The most important building is the temple of Isis which probably occupies the site of an earlier shrine. West of the Temple of Isis are a gate built by the Emperor Hadrian and the Temple of Harendotes, while to the e. is the Temple of Hathor. Nearby is the beautiful many-columned pavilion known as 'Pharaoh's bed.' Except from August to December, when the water is allowed to flow freely through the gates of the dam, Philæ is partially submerged.

**Philanthropy**, a love of mankind as evinced in deeds of practical benefit for the good of one's fellows. While similar in meaning to charity, philanthropy differs from it in this respect, that where charity may and often does help men individually, philanthropy helps them as members of society, in numbers.

**Philately**, a name suggested by Herpin of Paris (1865) to express the stamp-collecting craze which sprang up some years (1885) after the appearance (1840) of the 'Id. black' and 'Mulready envelope' of Sir Rowland Hill in Great Britain. The London Philatelic (founded 1869), La Société Française de Timbrologie (1874), and the American Philatelic Association are the chief societies. See POSTAGE STAMPS.

**Philemon**, Greek poet, earliest exponent of the Attic new comedy, began to write about 330 B.C., and continued to do so until 262. He wrote nearly one hundred plays, fragments of which show much wit, liveliness, and knowledge of the world. He was a greater favorite at Athens in his day than Menander.

**Philemon**, Epistle to, the shortest of Paul's letters, written during his Roman imprisonment. The letter deals with a purely private matter, the restoration of Onesimus, a slave in Philemon's house.

**Philemon and Baucis**, in Greek mythology, a devoted couple from whom Zeus and Hermes received hospitality. On being told

by Zeus that any particular wish they desired would be granted, they begged to be allowed to serve in the temple and end their days together. This was granted and at death they were transformed into trees standing side by side.

**Philharmonic Societies**, now established in many cities of Europe and America, are institutions which have for their chief aim the encouragement and cultivation of instrumental music. Among the more important of these societies in the United States, may be mentioned the New York Philharmonic Symphony Orchestra, the Boston Symphony Orchestra, and the Philadelphia Orchestra.

**Philidor, François André Danican** (1726-95), French musical composer and chess-player, was born in Dreux. His fame rests on his skill at chess, at which game he was without a rival.

**Philip**, the apostle, one of the twelve, belonged to Bethsaida in Galilee.

**Philip**, the evangelist, was one of the seven so-called 'deacons' chosen to be stewards of the poor fund in the church at Jerusalem; but the few known facts of his life are connected with apostolic or missionary work.

**Philip I.** (1052-1108), king of France, began to reign in 1060. Before his death Philip had annexed Vexin and Valois, and had purchased Bourges; he had also given Vermandois to his brother Hugh.

**Philip II.** (1165-1223), better known as Philip Augustus, king of France, came to the throne in 1180. He steadily pursued a policy of consolidation, checking the great nobles, and adding fresh territory to his kingdom. Taking advantage of John's weakness and unpopularity, he conquered Normandy in 1204, and Anjou, Touraine, and Poitou shortly afterward. The victory of Simon de Montfort over the Albigensians and their allies at Muret in 1213 ensured the final victory of the French monarchy in Languedoc. Philip strengthened and thoroughly reorganized the central and local administrative arrangements, and established a council of able officials to aid him in the government. His support and improvement of the towns was a marked feature of his reign. Paris made immense progress, and many charters were granted to other cities. On his death France was one of the great states of Europe, and the royal power was firmly established.

**Philip IV.**, called 'Le Bel' (1268-1314), king of France, began to reign in 1285. Like Philip Augustus he was resourceful and unscrupulous. For some years he was engaged in

a quarrel with Boniface VIII. After an uneasy truce, the quarrel burst out again in 1300, Boniface issuing the bull *Unam Sanctam*, in which he reasserted his authority. Philip, supported by the States-general, in 1302 resisted the Pope, who was imprisoned for a few days at Anagni in S. Italy. On the election of Benedict XI. the cardinals divided into two factions, French and Italian; and in 1305 the former triumphed in the accession of Clement V., who in 1309 fixed his residence at Avignon, where the popes remained for some seventy years. Clement supported Philip in his suppression of the Knights Templars (1307-12). Philip strengthened the royal authority, checked feudalism, supported the middle classes, and first summoned the States-general. He also increased the power and duties of the Parlement of Paris, and effected important changes with regard to the king's council.

**Philip VI.** (1293-1350), king of France, became king in 1328, and was founder of the Valois dynasty. Shortly after his accession he avenged the defeat of Courtrai by a victory over the Flemings at Cassel. Being resolved to expel the English from the s. of France, he in 1336 invaded Gascony, supported David Bruce against Edward III., and persuaded the Count of Flanders to arrest all English merchants in Flanders. The struggle over the Breton succession gave Edward a fresh occasion for interference, and in 1346 the French were defeated at Crécy (August 26).

**Philip II.** (1527-98), king of Spain. Having successfully stamped out Protestantism in Spain, he endeavored to carry out the same policy in the Netherlands. A revolt ensued, which resulted in the independence, under William of Orange, of the seven United Provinces. Though Philip defeated the Turks at Lepanto in 1571, and annexed Portugal in 1580, he failed to conquer England; and the defeat of the Spanish Armada in 1588 marked the beginning of the decline of Spain.

**Philip III.** (1578-1621), king of Spain, the son of Philip II., was a pious and unambitious man. Under him Spain continued her downward course, partly in consequence of the expulsion of the Moors from Spain in 1609, partly through the close alliance with the Austrian Hapsburgs, owing to which Spain became involved in the Thirty Years' War.

**Philip, King** (?-1676), Indian chief whose real name was Metacomet, the younger son of Massasoit, sachem of the Pokanokets, a tribe living in what is now southeastern

Rhode Island. He is famous in history as the chief figure in the most destructive Indian war in which the English colonists were engaged in the seventeenth century. It nearly destroyed the colonies in New England, but when it was over the Indian power was utterly broken. Philip himself, who succeeded his brother as sachem in 1662, had been long known and friendly to the English, like his father. But he seems to have seen clearly that the settlement of the country must result in the destruction of his own people, and as time went on he fell under the suspicion of the English. The actual outbreak of what is known as King Philip's War was probably accidental (1674), arising from the murder of Sausamon, a converted Indian, and the consequent English executions and Indian reprisals. Philip and his people were at once driven from their ancestral properties, and he himself fled to the Indians of the interior. The Nipmucks, a powerful tribe of central Massachusetts, now began a series of devastating attacks upon the frontier settlements, in which twelve of the English towns were entirely destroyed and more than half were made the scene of burning and massacre. The greatest disaster was on Sept. 18, 1675, when Capt. Lathrop's company, the 'flower of Essex,' was almost entirely destroyed at Bloody Brook, near Deerfield, which had been burned a fortnight before. 'New England had never seen so black a day,' writes Cotton Mather in the *Magnalia*. The superior power of the English, however, gradually overcame resistance. The Narragansetts, who were planning to join the war, were put down by a strong expedition under Col. Winslow in the winter of 1675. The Indians were attacked in their stronghold in the frozen swamps of Kingston, R. I., and their power entirely broken. The Nipmucks also were several times beaten, and Philip fled to his old abode at Mount Hope, R. I., where he was hunted down and killed (Aug. 12, 1676) by a party under Capt. Benj. Church. See Fiske's *The Beginnings of New England* (1889).

**Philip, The Bold** (1342-1404), Duke of Burgundy, married the only daughter and heiress of Louis, Count of Flanders, and on the latter's death, in 1383, secured Flanders, Artois, Rethel, Nevers, and the county of Burgundy, or Franche-Comté. He thus laid the foundations of the greatness of his house in the following century. In 1392, when Charles vi. became insane, Philip assumed control of affairs in France. The rivalry between Burgundy and the Duke of Orleans,

brother of the king, now became of importance, and the factions of the Burgundians and Orleansists were formed. Orleans favored an attack on England on behalf of the deposed Richard II.; Burgundy leaned to an alliance with Henry IV.

**Philip, The Good** (1396-1467), Duke of Burgundy from 1419 to 1467, was born at Dijon, a son of John the Fearless and a grandson of Philip the Bold. Under Philip, Burgundy was the most wealthy, prosperous, and tranquil state in Europe; its ruler was the most feared and admired sovereign of his time, and his court far surpassed in brilliancy those of his contemporaries.

**Philippi**, city, n.e. Macedonia, taken by Philip of Macedon from Thrace, and enlarged and renamed in his honor. It was the first place in Europe at which St. Paul preached (53 A.D.), and one of his epistles is addressed to the church there.

**Philippians, Epistle to**, one of the shorter epistles of the apostle Paul, written during his imprisonment at Rome (or, as some think, at Cæsarea), and addressed to the church at Philippi, which he had founded on his second missionary journey.

**Philippics**, originally the three orations of Demosthenes against Philip of Macedon. The name was afterwards applied to Cicero's fourteen orations against the ambitious and dangerous designs of Mark Anthony. It is now commonly employed to designate any severe and violent invective, whether oral or written.

**Philippine Islands.** The Philippine Islands are a part of the great East Indian Archipelago, lying in the Pacific Ocean s. of Japan and n. of Borneo and Celebes, between the parallels of 4° 40' and 21° 10' N. lat. and between the meridians of 116° 40' and 126° 34' E. long. Counting everything above high water, the total number of islands and islets is 7,083, of which, however, only 2,441 are named, and 456 have areas exceeding one sq. mile each. There are 31 islands of one hundred sq. miles or more. The total land area of the archipelago is about 114,400 sq. miles.

The general character of the islands is mountainous, although in the larger islands, especially in Luzon and Mindanao, there are broad plains and valleys of considerable extent. The highest mountain in the archipelago is Mount Apo (or Davao), in the southeastern Mindanao, 9,610 ft. There are few rivers navigable for large craft. Cagayan river will float launches as far as Tuguegarao, the capital of Cagayan prov., while bancas can



go up the river one hundred and sixty miles, and rafts forty miles farther. This is by far the most important stream in the archipelago in this regard, as all the tobacco raised in this, the chief tobacco region, is taken out down the river. In Mindanao, the Rio Grande de Mindanao and the Agusan, the largest rivers of the island, each more than 200 miles long, are navigated by small steamers for considerable distances. The coasts are very intricate and dangerous by reason of the coral reefs which border them and, except for such parts as have been charted by the Coast Survey since American occupation, they are very badly charted. Good harbors that are safe in all winds and easy of access are few. The bay of Manila, thirty miles wide, is too open to afford safe anchorage. An artificial harbor with piers has been constructed, however, making Manila one of the

the southwest monsoon these conditions are changed, this being the wet season for most of the archipelago. The amount of annual rainfall ranges in different places from 25 to 100 inches, the heaviest being upon the eastern coast of Luzon and Mindanao. The average rainfall at Manila, determined by many years of observation, is 50 inches (approximately that of the Gulf coast in the U. S.) seven-tenths of which falls in the monsoon season. Although the heat is tempered by proximity to the sea, the temperature is high at all times of the year. At Manila, which in this matter well represents the archipelago, the mean annual temperature is 80° F. The mean of the coolest month, January, is 77°, and of the warmest month, May, it is 84°. The average daily range in temperature is but 12°.

The archipelago is of volcanic origin, lying



*Copyright Ewing Galloway, N. Y.*

*Philippine Islands: Natives preparing the rice fields.*

few ports in the Orient where vessels can tie up to piers to load and unload.

The climate of the islands is the result of several conditions—their insular position; their location within the tropics, and within the area subject to the monsoon influences of Asia; and their topography. For eight months of the year, from October to June, the prevailing wind is the northeast trade, and for the remaining four months the southwest monsoon. During this monsoon period the islands, especially those toward the n., are subject to frequent typhoons, or baguios, as they are locally called. They often cause great damage to shipping and to the native towns.

The eastern coast of the islands is mountainous, and therefore receives most of the rain brought by the northeast trades. For two-thirds of the year this is a stormy region, while the remainder of the archipelago enjoys fine weather. During the prevalence of

within the Pacific volcanic belt. In the archipelago there are some dozen active volcanoes and numerous extinct cones. In many localities there are evidences, in the form of lakes and interrupted drainage, of recent changes of level. Earthquakes are fairly frequent in all parts of the archipelago. The flora is tropical and luxuriant, and in general resembles that of other East Indian Islands. Certain features of the Australian flora are traceable in the s., and in the n. are plants related to the flora of southern China. One noticeable peculiarity is the vast number and variety of fiber plants, in which this archipelago excels all other parts of the earth.

It is plain that both fauna and flora have been isolated for a long period, in which time the species have developed away from the parent form. Largely on account of these peculiarities, these islands form an interesting locality for study for both botanist and

naturalist. The only large mammalia are the carabao and timarao. Strange to say, certain species of birds are peculiar to certain islands. Saurians and monkeys are abundant, as are also insects, in variety, though not in number. The waters teem with fish of a great variety of species.

The forests are of great extent, and include a variety of woods, many of which are valuable. Woods suitable for the finest cabinet work, for veneering, and for artistic work are abundant. There are also gutta percha, rubber, and other gum- and resin-producing trees, tan and dye woods, and medicinal woods and plants, besides much rattan and bamboo. The most common varieties of edible fish are mackerel, herrings, sardines, tunas, and porgies. Other sea products are pearls, pearl shells, window shells, shark fins, sponges, and trepang. As an industry, however, fishing is undeveloped. In practically all of the larger islands there is gold, which in some places has long been worked by the natives, and which now forms one of the most important mineral products. Coal, iron, manganese, lead, copper, and other minerals are found. The most important branch of industry is agriculture. While it is not in a highly developed stage as yet, assistance from various branches of the government is doing much for it. The soil is rich, being composed in the main of disintegrated volcanic rock, and the climate is most favorable. Rice is the staff of life to the Filipinos. The rice farmers are coming to realize the advantages of scientific methods. It is still necessary, however, to import great quantities of rice, especially from French Indo-China. Tobacco, of a quality excellent for cigars and cigarettes, is grown in all parts of the archipelago, but most abundantly in northern Luzon. Hemp, or abaca, is the most important export and is peculiar to these islands. It is the inner bark of a species of palm closely related to the banana. A government inspection system has greatly helped this industry. Coconut groves are found near the seacoast almost everywhere, but half of the copra, the dried meat of the coconut, comes from southern Luzon. Corn, or maize, is grown in limited quantities in various localities from northern Luzon to the Visayan Islands. Sugar-cane is grown in nearly every province, but more than half of the product of the archipelago comes from the island of Negros, and more than a third from Luzon. Sweet potatoes are grown in all parts of the

islands, and form an important article of food. Cacao is produced in small quantities in nearly all provinces.

The carabao, or water buffalo, is the chief farm animal, and as much of the work is in the wet rice paddies he is admirably adapted to it. For riding and driving, the small native ponies are chiefly employed. Chickens are raised mostly for food, but also in large numbers for the cock-pit. In 1898, when the United States took possession of the Philippines, there existed only one line of railroad (narrow gauge), stretching 120 m. between Manila and Dagupan. This was extended from time to time until, by 1938, 875 m. had been constructed. In 1938 the islands had a total road mileage of 11,000. There were, besides, 3,000 m. of trails good only for horses. In 1933, radio-telephone service was established between Manila and Washington, D. C.

The Filipinos, although possessed of much aptitude, power of imitation, and natural ability in mechanical work, are not largely engaged in manufactures. They prepare their agricultural products for market and weave cloth, hats, baskets, and mats for their own use, all this work being done on a small scale by hand or by simple and primitive appliances. Nearly all the factories are small. These include sugar mills, coconut oil mills, and cigar and cigarette factories. In recent years, rice milling has become one of the principal local industries. Hundreds of small rice mills are scattered over the archipelago, with a maximum daily capacity of 50,000 cavanes. At present sugar and rice mills are the leading industries, with oil factories, abaca pressing, and cigar and cigarette factories next, in the order named.

Free trade obtains between the Philippines and the United States, but the American Congress placed a 20% tariff on foreign imports into the Philippines. Commerce is conducted, apart from the United States, chiefly with the United Kingdom, Japan, China, the French East Indies, Germany, and Spain. The total population is estimated at 16,000,000. Nearly all the people are closely crowded in towns or villages and nearly two-thirds of the people live on or near the seacoast. The chief city, and the center of population, government, commerce, manufactures, and society, is Manila, estimated population, 623,000, situated on the eastern shore of Manila Bay. Chinese immigration is prohibited (Chinese Exclusion Act, 1903), and Chinese laborers must register.

The Roman Catholic Church predominates

but there are millions of Independent Catholics. A number of Protestant denominations have established flourishing organizations, which comprise many communicants. There is an Independent Filipino Church in Luzon. All the Moros are Mohammedans, and there are, in some of the most isolated districts, some 800,000 pagan tribesmen. In education, the American system established by the Philippine Commission in 1901 provided a course of instruction covering eleven years—4 primary, 3 intermediate, and 4 secondary. Public educational work is under the supervision of the Secretary of Public Instruction, performed through the Bureau of Education. Education is free but not compulsory between the ages of 7 and 14. Pupils are taught the English language. Several special schools, some of which are particularly for the non-Christian people, are supported by many private schools (all grades). About sixty per cent of the children of school age do not attend any school. Higher education is provided for by the University of the Philippines. In Manila there is a university, with a medical school connected with it. There are several normal schools, and a number of schools and colleges under religious orders.

Until the passing of the McDuffie-Tydings Act for the recognition of Philippine Independence (1934), the United States maintained in the Islands an organization of troops of the United States Army, which included several regiments of Filipino soldiers. Public order being maintained by the municipal police and the Philippine Constabulary. There are two United States naval stations in the Philippines, one at Cavite and the other at Olongapo. One Filipino cadet was appointed to each class at West Point. On Aug. 29, 1916, the Organic Act of the Philippine Islands (the Jones Law) abolished the Philippine Commission and provided an autonomous form of government for the Philippines. The following officers were appointed by the President of the United States: Governor General, who was the chief executive; vice governor, who served also as secretary of the Department of Public Instruction; the auditor; the deputy auditor; and the members of the Philippine Supreme Court. There was a legislative body of two branches, Philippine Senate (24 members) and House of Representatives (93 members). The six executive departments were: Interior, Public Instruction, Finance, Justice, Agriculture and Natural Resources, and Commerce and Communications. The Governor General, by and

with the consent of the Philippine Senate, appointed the secretaries of departments, who were all Filipinos. There was a supreme court, composed of a chief justice and eight associate justices; and for every organized municipality and any other places determined upon by the Philippine Senate there was one justice of the peace and one auxiliary justice. Also, there were twenty-seven judicial districts each having a judge of first instance—except the ninth district, covering the city of Manila and having six judges, and the third, fifth, sixth, seventh, fifteenth, twentieth, and twenty-third having two each.

The non-Christian or native races may be divided into three main groups: the Pygmies; the Indonesians; and the Malays. The Pygmies, or dwarf races, probably constitute the aborigines of the Islands and are gradually disappearing before the inroads of civilization. There are three distinct types of Pygmies, the Negritos, the Proto-Malays, a straight-haired dwarf type of Mongoloid affinity, and the Australoid-Ainus, a dwarf hairy type intermediate between the aborigines of Australia and the Ainus of Japan. The Pygmies are found in Apayao, the Ilokos mountains, Zambales, East and South Luzon, the Visayan Islands and Mindanao. They are mostly nomads or semi-nomads and live by hunting and trapping. They number about 55,700. The Indonesians are a taller race, having marked affinity to the tall races of southern Asia. They are usually characterized by a rather light skin, slender body and aquiline features. They are found in Northern Luzon, Eastern and Central Mindanao, Zamboanga, and Sulu. They practice a crude sort of agriculture, have two types of houses, one in the tops of tall trees and the other directly on the ground, and tattoo their bodies extensively. They number about 175,000.

The Proto-Malays, who number about 550,000, may be divided into two main groups: pagans and Mohammedans. Some of the pagans probably have the greatest system of stone-walled terraced rice fields to be found in the world. The Mohammedan Malays, who number about 375,000, have highly developed the industrial arts, being expert in metal work, wood-carving, and weaving. They are excellent navigators, and pearl fishing is an important industry which has given them world-renown. They carry on an extensive dry agriculture and raise many fruits and vegetables. Many road and

write their own language; they are proud and independent. Physically, the Filipinos are short and slight, with thin arms and legs, and poor muscular development. The hands and feet are small and delicate. The color is a rich brown, varying in shade with the social status, persons of the higher class often being as light as Spaniards. The eyes are large and brown, frequently with a decided slant; the nose is small and the lips somewhat full. The hair is abundant, coarse, long, and blue-black in color. They are extremely cleanly in their persons. In disposition they are dignified, courteous, generous to their friends, and hospitable to a fault; they are bright and quick, often even brilliant, but superficial, and not deep or profound thinkers. They are lovers of music; every village has its band of music, and probably the finest band in the Islands is that of the Constabulary, composed entirely of natives. The Filipinos are not a long-lived people. They mature and die early. The average age at death of the people of the archipelago is but 23.2 years, while in the registration area of the United States it is twelve years greater. In other words, the average Filipino lives only two-thirds as long as the American. The normal death rate, about 32 per thousand per year, closely approximates that of the negroes of the United States.

The authentic history of the Philippines begins with their discovery by Magellan. Their inferred history begins at a much earlier though unknown date, when the islands were sparsely peopled by little blacks, the ancestors of the present Negritos. Several abortive attempts were made by Spain to conquer and colonize the islands. In 1570 Manila was captured and made the seat of government, and shortly afterward the entire archipelago, excepting the southern islands occupied by Moros, fell under the power of Spain. Shortly after the pacification of the islands, friars in large numbers were sent out as missionaries. In time these friars assumed control not only of the spiritual welfare of their charges, but of their government and physical welfare also, and the degree of civilization which the people of the islands has reached is mainly the work of the friars. Of all the church orders represented in the islands, the Jesuits had become the richest and most powerful. Largely on account of this they incurred the enmity of the others, who persuaded the king of Spain to expel them. This took place in 1767. The Jesuits departed quietly, leav-

ing their vast possessions to be divided among the other orders and the Catholic Church. In 1850, however, the order was allowed to return. In April 1898, war was declared between the United States and Spain. By the treaty of Paris, Dec. 10, 1898, Spain ceded the Philippines to the United States, which agreed to pay \$20,000,000 for them. (See SPANISH-AMERICAN WAR.) Early in the following February the Filipinos, dissatisfied at not being given their freedom, broke out into insurrection against the American government. Conflicts followed, and it was not until July 4, 1901, that the islands were sufficiently pacified for a civil government. The American government purchased land from the friars paying nearly \$7,000,000. In 1916, for the first time, the Philippine legislature had an all-Filipino membership. The Philippine Islands were prompt to declare their loyalty to the United States when the latter entered the Great War in April, 1917, but upon the signing of the Armistice the Philippine legislature constituted an Independence Mission which proceeded to the United States without obtaining any definite result. The following year President Harding sent a commission to make a survey. It recommended 'that the present general status of the Philippine Islands continue until the people have had time to absorb and thoroughly master the powers already in their hands.'

Appointed by President Harding, Governor General Wood balanced the budget and checked the currency depreciation. General Wood, however, incurred the enmity of some of the Filipino leaders who claimed that he had exceeded his powers. They redoubled their efforts to secure immediate and complete independence, without avail. After another survey by President Coolidge and governorship under Stimson and Davis, sentiment in the Islands for complete and immediate independence had not abated, although it was by no means unanimous. Many people in the United States too, especially those whose business interests were jeopardized by the absence of a tariff on imports from the Philippines, favored separation.

In September, 1931, Secretary of War Patrick J. Hurley visited the islands. He was given a resolution by the insular legislature memorializing the United States Congress for complete independence. After Secretary Hurley's report, President Hoover stated: 'Economic independence of the Philippines must be attained before political independence can be successful.' Senator Manuel Quezon, a

Filipino leader, offered a compromise plan under which the Islands would be given wider autonomy and complete independence at the end of ten years. The McDuffie-Tydings Law, was signed by President Roosevelt in March, 1934. This Law, provides among other things that, after ten years as a commonwealth, under the jurisdiction of the U. S., which includes trade restrictions, the Philippines will have complete independence, the Filipinos to present a satisfactory constitution and vote approval of the Law. These conditions were met by the constitution approved by President Roosevelt on March 23, 1935, and almost unanimously adopted by the Filipinos the following May 14. Subject to it, in 1935, Manuel Quezon and Sergio Osmena were elected President and Vice-President of the Commonwealth of the Philippines, which in the year 1946 would become the Republic of the Philippines. Japan attacked the Philippines Dec. 1941 and overran the islands, capturing Manila. May 6 Corregidor fell. When Pres. Manuel Luis Quezon arrived in Washington, D. C., in May, 1942, a Government-in-Exile was established. In Sept. 1943 the Japanese set up a puppet government in Manila, with José P. Laurel as President. Pres. Roosevelt promised independence after the war. In June 1944 Congress passed a bill extending the terms of Pres. Quezon and V. Pres. Sergio Osmeña until the Japanese had been driven out. In Aug. Pres. Quezon died and Osmeña became President. For later developments see **World War II Chronology**.

**Philippines, University of the**, a state-supported institution of higher learning, in Manila, P. I. It has colleges of Medicine and Surgery, Engineering, Liberal Arts, Law, Veterinary Medicine, and Agriculture.

**Philippopolis**, or **Felibi** (Bulg. *Plovdiv*), city, Bulgaria. It has several mosques, a museum, and national library, and is the seat of Bulgarian, Greek and Catholic bishops; p. 84,655.

**Philippus, Philippus II.**, generally called **PHILIP OF MACEDON** (382-336 B.C.), was born in Pella. On the death of his brother, Perdiccas III., in 359, he became regent for his brother's infant son Amyntas. After a few months, however, he deposed Amyntas and usurped the throne. In a year Philip had secured the safety of his kingdom and entered upon the policy of aggression which characterized his reign.

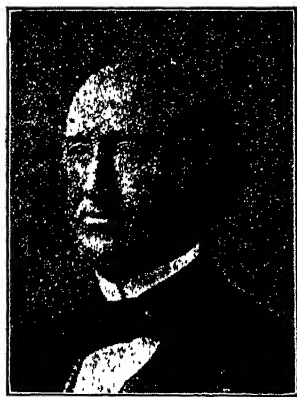
Philip is one of the greatest personages of history; but the superior greatness of his

son, and his depreciation by Demosthenes, have obscured his fame. His purpose was to unite the small Greek states into a national confederacy. His desire was to do so by their consent; but their mutual jealousy, their passion for autonomy, and their contempt for him and his countrymen, forced him to attain his end by arms. His success over the Greek states was due first to his diplomacy and his judgment of the right time for action, and secondly to his army. This was the first national and professional army known to history; its regiments were organized on a territorial basis; and his development of the phalanx and his heavy cavalry showed an advance on the tactics of the time.

2. **PHILIPPUS V.** (237 to 179 B.C.), was the son of Demetrius II., and one of the ablest of Macedonian kings.

3. **MARCUS JULIUS PHILIPPUS**, emperor of Rome from 244 to 249 A.D.; his son, of the same name, shared his power during the last two years of his reign.

**Philistine**, a contemptuous epithet for the unilluminated, popularized by Matthew Arnold (*Culture and Anarchy*, 1869), is borrowed from the German students, who were accustomed to apply the term *Philister* to the non-academic working classes.



Wendell Phillips, the Abolitionist.

**Philistines**, a people of Canaan who occupied a long strip of land, from 15 to 20 m. broad, along the Mediterranean from Ekron to Egypt. They were relatively well civilized, proficient in agriculture, metal-working, and the plastic arts, and of high military capacity. Though their territory fell within the inheritance of Judah, they were not subjugated in the Israelite conquest under Joshua, and they harassed Israel in the time of the

judges. But after David's time they were never very strong, and they ultimately disappeared as a nationality in the invasions of Assyria and Egypt, though not before stamping their name upon the whole country—Palestine, from Pelesheth, Philistia.

**Phillip, John** (1817-67), Scottish painter, born in Aberdeen. It was not till 1851, when he went to Spain, that his full powers developed, and he painted his celebrated Spanish pictures. He only of the British artists of his day gained something of the *verve* of Velasquez, a broad and virile technique. His best-known pictures are *Collecting the Offering at a Scottish Kirk*, *La Gloria* (National Gallery, Edinburgh), and *The Promenade* (National Gallery, London). His *Gossips at the Well* is in the Metropolitan Museum, New York.

**Phillips, Adelaide** (1833-82), American contralto singer, born at Stratford-on-Avon, England, and brought to Boston, Mass., when she was seven years old. In 1854, after singing in concert with marked success, she appeared at the New York Academy of Music in 1856 as 'Azucena' in *Il Trovatore*. For the next twenty years she ranked as the leading operatic contralto of the country.

**Phillips, David Graham** (1867-1911), American author, born in Madison Ind. He was a frequent contributor to the leading magazines, and the author of: *The Great God Success* (1901); *Golden Fleece* (1903); *The Plum Tree* (1905); *The Reign of Guilt* (1905); *Susan Lenox* (1917).

**Phillips, Stephen** (1867-1915), English poet, was born in Somerton, near Oxford. His works in their dignity of conception and beauty of language represent an attempt to return to the Greek model, though still in thought essentially modern. Later works include *Poems* (1897); *The Sin of David* (1904); *The Last Heir* (1908); *Pietro of Sienna* (1910); *The King* (1912); *Iole* (1913); *Lyrics and Dramas* (1913); *Panama and Other Poems* (1915); *Armageddon* (1915).

**Phillips, Wendell** (1811-84), American reformer, was born in Boston, Nov. 29, 1811, of an old and well known Massachusetts family. He joined the Massachusetts Anti-Slavery Society and on June 14, 1835, delivered a noteworthy speech at the quarterly meeting of the society at Lynn. The act was regarded as professional and social suicide, but it was characteristic of Phillips, who was throughout his life to be a champion of de-

spised causes. His first famous utterance on the subject was at a meeting held in Faneuil Hall, Dec. 8, 1837, to protest against the murder of Lovejoy. By this speech he became the pre-eminent orator of the anti-slavery movement. Phillips' position on this burning question having injured his law practice, he was led to enter upon a different career, that of a lyceum lecturer. One of his earliest, as it remained his most famous lecture, was that on *The Lost Arts*.

In October, 1842, in a meeting called to protest in the Latimer case, Phillips first denounced the Constitution of the United States under which, according to Judge Shaw, a fugitive slave had no right to a trial by jury. He closed his law office, being unwilling to take an oath to support the Constitution and gave up the franchise, refusing to take any personal responsibility in a government which involved the principles of slavery. He now became a public man in the simplest and most individual way. Excluded from all the institutions of society, he appeared personally before anybody and everybody that would listen to him, and argued his opinions. He was strongly opposed to the Mexican War, and severely criticised the action of Governor Briggs of Massachusetts (May 26, 1846) in calling for volunteers. Throughout the period leading to the Civil War, Wendell Phillips was the representative figure of the ultra anti-slavery position of that body that demanded the dissolution of the Union, that the North might not be forced into responsibility and complicity with the unrighteousness of the slave system. When, however, disunion became a fact, in the firing on Fort Sumter, Phillips became an emancipationist, and favored a war for the Union and emancipation of the slaves. As he himself said, he had meant to make a free nation of nineteen States, and now saw the possibility of a free nation of thirty-four States. To this object he added the enfranchisement of the negro, and activity and agitation to this end absorbed his powers until the passage of the Fifteenth Amendment. He died on Feb. 2, 1884. See his *Speeches, Lectures and Letters*. Consult also Austen's *Life and Times of Wendell Phillips*; Russell's *The Story of Wendell Phillips*.

**Phillips Academy**, a boys' preparatory school at Andover, Mass., often known as Phillips-Andover to distinguish it from Phillips-Exeter. It was founded in 1778, its establishment being due to Samuel and John Phillips.

**Phillips Exeter Academy**, a boys' preparatory school in Exeter, N. H., incorporated in 1781 and named for Dr. John Phillips. It is well equipped with academy buildings, laboratories, library, gymnasium, fine dormitories, and athletic fields, and numbers among its graduates Daniel Webster and George Bancroft.

**Phillpotts, Eden** (1862- ), English novelist, was born in Mount Abou, India, his father, Capt. Henry Phillpotts, being an officer in the British army. His portrayals of life in Devonshire are especially notable. Among his long list of works, chiefly novels, are *Children of the Mist* (1898); *Sons of the Morning* (1900); *The River* (1902); *The Secret Woman* (1905); *The Whirlwind* (1907); *Widcombe Fair* (1913); *The Bronze Venus* (1921); *Bred in the Bone* (1932); *A Cup of Happiness* (play 1933); *Awake Deborah* (1941).

**Philoctetes**, a famous archer, the friend and armor bearer of Hercules, who bequeathed him his bow and poisoned arrows. As one of the suitors of Helen, he led seven ships against Troy; but being bitten in the foot by a snake, he fell ill. The Greeks left him on the island of Lemnos, where for ten years he spent a miserable life. But an oracle declared that Troy could not be taken without the arrows of Hercules, so Ulysses and Neoptolemus were dispatched to bring Philoctetes to the Greek camp; where, healed by Aesculapius or his sons, the restored hero slew Paris, and helped powerfully in taking Troy. After the war he settled in Italy. A play of Sophocles is named for him.

**Philodendron**, a genus of tropical American shrubs and trees and occasionally herbaceous plants, belonging to the order Araceae. Some of them climb.

**Philo Judæus**—i.e. the Jew—(b. c. 20 B.C.), Hellenistic philosopher and theologian, of Alexandria. The distinguishing feature in Philo is what he finds in his allegories—viz. the doctrines of the syncretistic philosophy of the age. He identified the God of Israel with the divine Being of Plato—transcendent, unconditioned by time, space, or quality, nameless even, except under the Tetragrammaton יהוה, Jehovah, the Existent; but also with the deity of the Stoics, immanent in the reason and goodness of the world. This God did not create the world directly, for that would have been to degrade his pure essence, but acted through the intermediary of 'powers' (*dunamis*), the chief of which is the Logos which, though Philo personi-

fies, he may not have regarded as personal.

**Philological Association, American**, a society established in 1869 as the outgrowth of the American Oriental Society for the diffusion of philological knowledge.

**Philology**, or the science of language, includes the description and explanation of the phenomena of language. The divisions of philology are necessarily determined by the nature of its subject matter, language. Language, whether understood as human speech or not, has both a physical and a psychological aspect. Viewed psychologically, language is an intelligible expression of feelings, thoughts, wishes, etc. It is more than a means of communicating thought. Physically, on the other hand, it is a part of the phenomena of sound; it consists of sound combinations produced by the vocal organs (of man). Within the wide range of human speech there are hundreds of systems, each complete in itself, and each called a language. A community which speaks one language may divide into several communities owing to political or geographical or economic causes. When such a division takes place, each of the newly-formed communities acquires a distinctive language of its own. The new languages are modified forms of the old, and therefore related to one another and to the 'parent' language.

In philology, as in political history or in the history of any art, the historical development of special periods and nations must be studied separately. At the same time, there is room and need for a general treatment of the nature of language and the principles of its development. The starting-point of linguistic study would be the modern languages with which we are most familiar. Here our knowledge is direct, and the record is fullest. This is particularly the case in the department of phonetics. We are never independent of the imperfect and misleading representations of writing except when we hear the speech of a people with our own ears. Man's capacity for producing sounds by the use of his vocal organs is the primary physical condition which has made the acquisition and development of language possible. The primitive nature of this capacity is evident from the extent to which it is possessed by the animal world in general. The expression of feeling by the involuntary utterance of sounds may be regarded as the initial stage in the development of language. The number of sounds used in any one language is comparatively limited, and although there

are considerable differences between languages in this respect, the total number of speech sounds in use is not very great.

This may be explained as the result of a process of unconscious selection. The best sounds, those most easily produced and distinguished, are those which have survived. It is not to be supposed that primitive man used fewer sounds than his descendants now employ. The opinion that the earliest historical languages, such as the parent Indo-European speech, possessed a very simple vowel system, is no longer maintained. The simplicity of primitive forms of speech does not manifest itself in the sound-combinations which they employ.

One of the best established results of modern investigation into the history of language is the conclusion that a never-ending and never-resting process of sound-change is at work in every language. The fundamental conditions of this process are chiefly these:—(1.) What is commonly called the same pronunciation of a word or sound really fluctuates within certain limits. Even the pronunciation of one individual is only approximately the same at different times and in different sentences. This opens the door at once to the shifting or displacement of the pronunciation of any word or sound. (2.) Language is constantly being transmitted from generation to generation, and in this process is particularly liable to alteration. Children acquire the language of their parents by imitation, and seldom if ever acquire it perfectly. (3.) Every speaker is constantly liable to sporadic 'mistakes.' For the most part these mistakes are common to many individuals, and they may finally supplant what was originally the 'correct' form. Alterations in the rate of speech, or a general movement in the position of the accent, may produce widespread effects. Modern research into the origin of words and their history has been greatly influenced by the doctrine of 'roots.' The roots of a language were got by stripping off all the formative and inflectional elements in a group of words related in meaning. The common element in these words, when there was one, was regarded as the 'root' from which they were all derived. A better understanding of the history of language has greatly shaken this hypothesis of a primitive root stage at the beginning of the development.

There are at least two types of word-

creation which may be regarded as primitive. 1. Simple sounds or syllables are repeated in the production of such words as 'papa' and 'mama' (both of these are widely diffused words and necessarily very old). 2. Man imitates the cries of animals and the sounds which he hears in nature. The words so produced are a subdivision of onomatopœic words.

The history of the relation of word forms to their meanings and of the changes which take place in the meaning of words is itself a vast field in philology. The causes of change are primarily psychological. Historical circumstances may have an important influence on the course of the development, but the law according to which change takes place is invariably psychological. That being so, the best classification of the phenomena is no doubt one based on the operative causes of change—*viz.* the various laws of association. A favorite classification is according to results, distinguishing cases of the extension or limitation of word meanings from others in which old and new meanings join side by side. This is not so instructive as the psychological classification, which makes prominent the causes of change. Every one is familiar with the manner in which a word acquires a new meaning because of the analogy perceived between the object it denotes and some other object: for example, the 'foot' of a table or of a hill is compared with the foot of an animal, and the word 'foot' thus acquires a new meaning. The constant use of the word 'town' for a particular town (say London) gives the expression 'town' a new meaning, and so forth. The very same psychological processes account for the changes in the meaning of terminations and grammatical forms in general. Prepositions and adverbs are frequently nouns in a specialized sense, which has been acquired from repeated use in circumstances which suggested more to the mind than the word originally implied.

It is now generally recognized that it is inaccurate to suppose that sentences are possible only after words have been created to become the materials used in their construction. Sentences expressing certain feelings and wishes and thoughts are at least as fundamental in speech as words that name objects. Words as independent elements, as linguistic facts with a recognized individuality, are certainly to a large extent



the result of abstraction from sentences. There has been and is still much controversy regarding the correct definition of a sentence. There is some diversity also in the current classifications of sentences. The variety of languages is so great, and the transition from one to another often so imperceptible, that it is difficult to discover any principle of classification. The historical investigation of the earliest known languages leaves us far away from the beginnings of speech. Whatever account is given of the origin of language, it is simply what to us is comprehensible or conceivable, an account which is in accordance with the physical and psychological constitution of man as we know it, and in agreement with the history of the development of language in its later stages. See Whitney's *Language and the Study of Language* (4th ed. 1884); Paul's *Principles of the History of Language* (revised ed. 1891); Skeat's *Philology* (1905); Jespersen's *Progress in Language with special Reference to English* (1894); Oertel's *Lectures on the Study of Language* (1901); Mencken's *The American Language* (rev. ed. 1921); *Treasury of English Aphorisms with American Variants* (1928).

**Philomela**, in ancient Greek legend, a daughter of Pandion, king of Athens; her sister Procne was married to Tereus, king of Thrace. Later, however, he was seized with a passion for Philomela, and dishonored her. She and Procne then took vengeance on Tereus by slaying his son Itys and setting his flesh before him to eat. Discovering this, he pursued them with an axe; and they were transformed—Procne into a nightingale, Philomela into a swallow, and Tereus into a hoopoe. Such is the usual form of the tale, but some versions make Procne the swallow and Philomela the nightingale. Thus in English poetry Philomela or Philonel is used as a synonym of the nightingale.

**Philosophical Society, American.** A learned body with headquarters in Philadelphia, founded in 1743 in pursuance of the suggestion of Benjamin Franklin, who became its first secretary and second president. In 1769 it joined with Junto, a society formed about 1758 under the present official title, the *American Philosophical Society held at Philadelphia for Promoting Useful Knowledge*. Among its presidents have been the astronomer David Rittenhouse and Thomas Jefferson. It owns valuable collections of books, portraits, busts and relics.

Membership in the society is a much prized distinction, given only to men of great attainments. It confers annually a gold medal, founded in 1785 by a gift from John Hycinthe de Magellan, for contributions to navigation, natural history, or astronomy. It publishes annual *Transactions and Proceedings*.

**Philosophy** (literally, a love of wisdom), is a system of principles, reasons, and laws which attempt to explain the knowledge we have of phenomena. This term is used in a wider and narrower sense. In the narrower sense it is identical with metaphysics. In the wider sense it includes, besides metaphysics, logic, ethics, and psychology; and this group is sometimes swelled by the addition of philosophy of religion, philosophy of law, etc. But the more we subdivide philosophy into philosophies in this way, the more we tend to confuse and obliterate the distinction. Moreover the philosophies in question seem to duplicate unnecessarily sciences which already exist under other names—viz., theology, jurisprudence, etc. The old term 'natural philosophy' is still used as a variant for physics. We may turn, then, to the traditional group of philosophical sciences—logic, ethics, and psychology. Morality, or ethics, is a quite definite and limited sphere or subject-matter, and is therefore, presumably, the object of a special science. And if it be argued that the study of ethics raises difficult metaphysical problems (such as free will), the same may be said of any other science if pushed far enough back. Psychology, some would say, is now definitely recognized as a natural science; it has become a science of experimental research carried on in laboratories. It is true, of course, that when we regard psychology as simply the complement of that part of physiology which treats of that nervous system and the functions of the brain, it does then belong to the domain of natural science. But the whole significance of mind is not exhausted by pointing to its correlation with a bodily organ. Some of the most eminent psychologists have expressly recognized that the differential of psychology as a science consists, not in dealing with a special department of knowledge from the point of view of its growth in the mind of the individual knower. Accordingly psychology, in so far as it is concerned with knowledge itself in one of its more general aspects, is a philosophical and

not a special science. A similar claim on the part of logic to the rank of a philosophical science will be more readily admitted. We must now consider what is meant by philosophy in the narrower sense of metaphysics. With Aristotle metaphysics is the highest of the theoretical sciences, and is defined as dealing not with any special aspect of what exists taken in abstraction from other aspects, but with 'being as such' or with the ultimate nature and principles of the real. Philosophers may be said in one sense to have always had before them one single aim, the same for all—*viz.*, the attainment of the most fundamental kind of knowledge within the reach of human reason.

The primary and outstanding condition which affects philosophic thought at the present time is the enormous development of the special sciences, each with its own definite sphere and task, and philosophy, which seems to be left with no definite task or sphere at all. In Greek thought, although the distinction between philosophy or metaphysics and the special sciences had attained a definite expression, science and philosophy were constantly united in the same person. The philosopher Plato was an expert mathematician. His great successor, Aristotle, may be said not only to have summed up in himself the whole scientific knowledge of his time, but also to have done far more than any other single thinker to extend the bounds and organize the work of scientific inquiry. Even in modern philosophy the conjunction of scientist and philosopher had long its eminent examples. Descartes was perhaps even greater as a mathematician and natural philosopher than as a speculative thinker. Leibniz, who shares with Newton, the origination of the differential calculus, combined with his speculative power wide knowledge and learning. Kant, before he produced his great philosophical works, wrote on physical science, anticipating in his speculations on the *Theory of the Heavens* the later theory of Laplace. Hegel was hardly a specialist in science like his predecessors, yet the materials of his system were derived from a very wide range of positive knowledge. With Hegel there begins to make itself felt more and more strongly a profound change in the relations between philosophy and science. By the very character and comprehensiveness of his system he was driven to treat of the subject-matter of physical science as well,

and for this task he was by no means so well equipped. Consequently his philosophy of nature laid itself open to scientific criticism—criticism all the more damaging on account of the lofty pretensions of his absolute philosophy. Hegel's is the last great system by which such pretensions have been made on behalf of philosophy. When we turn to the writings of Lotze we find a very different tone. 'Though I venture,' says Lotze, in the preface to his *Logic*, 'to describe the present work as the first part of a system of philosophy, I hope that this designation will not be supposed to indicate the same pretensions which it was wont to herald in times gone by. It is obvious that I can propose to myself nothing more than to set forth the entirety of my personal convictions in a systematic form.' The change of tone, quite apart from mere reaction, was inevitable. The enormous extension and continually-increasing specialization of science have made it quite impossible for any one man to think of comprehending, in Hegelian fashion, within the framework of a formally complete and rounded system, the masses of material that are now available. Philosophers like Lotze, or Wundt, who do possess an extensive working knowledge of this sort, are few. But the ordinary philosophical writer and teacher cannot expect, on the ground of his own acquaintance with scientific methods and results, any great amount of deference from men of science.

In these circumstances many are disposed to deny that a metaphysics in the older sense of a theory of the ultimate nature and principles of the real can be attempted at all, and to hold that all that philosophy can aim at is a theory of knowledge. So great, no doubt, does the difficulty of metaphysical construction appear when we think of the vast material supplied by the special sciences, that we cannot wonder that many would fain see metaphysics driven out once for all, and the special sciences put in sole possession of the field. But the philosophical impulse is too deeply rooted in the human mind not to reveal itself sooner or later in other directions. The specialist himself is only too apt to turn philosopher; and ignorance of previous work in the subject is no more likely to be an advantage in philosophy than in science. There is another group who would supplant metaphysics, not by the special sciences, but by the doctrines

of religion. This view is in its developed form the doctrine of a theological school, and would by no means be accepted by theologians generally. Theology itself is in a very transitional stage, and in their struggle with the problems opened up by historical criticism theologians are apt to pay but little heed to the more philosophical questions raised by their dogmatic creed. And, on the other hand, philosophers are apt either to ignore the doctrines of religion altogether, or, what is worse, to assume with easy confidence that as philosophers, they know all about religion already, and need not trouble to ascertain the views of those whose faith and bent of mind have made religious thought the business of their lives. So long as the present transitional stage of theology continues, it is difficult, if not impossible, for the philosopher and the theologian to come to terms. Consult Ladd's *Introduction to Philosophy* (1890) and Rogers's *Brief Introduction to Philosophy* (1899); Paulsen's *Introduction to Philosophy* (9th ed. 1903; trans. 1898); Bergson's *Creative Evolution*; and the popular treatment in Durant's *The Story of Philosophy*.

**Philostratus** (c. 170 to 250 A.D.), a Greek rhetorician, and a native of Lemnos, who spent most of his life at Rome. The most important of his works is his *Life of Apollonius of Tyana*.

**Philtre**, a love-compelling magic potion or charm, common in decadent Greece and Rome in mediæval Europe, and still in use in the East.

**Phipps, Henry** (1839-1930), American manufacturer and philanthropist, the son of a shoemaker, was born in Philadelphia, Pa., removing to Pittsburg in boyhood. He became connected with Andrew Carnegie in the manufacture of iron. He presented conservatories to Pittsburg, gave largely to missions and charities, and in 1905 established a trust in New York city for the buying of land and the building of tenements thereon for working people.

**Phips (or Phipps), Sir William** (1651-95), Colonial governor of Mass., said to have been one of 26 children, all of the same mother, and born in a settlement in Me. Until 18 years of age he was employed in tending sheep. Later he became possessed with the idea of fishing up the treasure in a Spanish galleon wrecked about 50 years before in the West Indies. He finally succeeded, and took from the wreck treasure

to the value of about £300,000, for which service he was knighted. While governor he displayed a rough and arbitrary spirit, and personally chastised the collector of the port and Capt. Short of the royal navy.

**Phlebitis**, or inflammation of a vein, has a double connection with thrombosis, since a thrombus leads to inflammation of the adjacent vein wall, and, on the other hand, an inflammatory condition of the lining membrane of the vein induces thrombosis. One form of phlebitis is known as 'white leg.'

**Phlogiston**, a 'subtle fluid' that was supposed by Stahl (1660-1734) to be combined with a 'calx' or ash in combustible bodies, and to be given off from them when burning took place.

**Phlox**, a genus of hardy plants belonging to the order Polemoniaceæ. They have salver-shaped corollas with five equal petals. Some of the species of phlox are large-growing border plants, others are of dwarf creeping habit, and suited for the rockery.

**Phocæa**, an Ionian colony on w. coast of Asia Minor. It was a place of some prosperity, and founded other colonies, of which the most important was Massilia, the modern Marseilles.

**Phocion** (402-317 B.C.), Athenian statesman and general, was elected strategus—one of the ten chief officers of state—as many as 45 times. Yet he was neither a great statesman nor a brilliant general; but he was a man of incorruptible honesty and downright common sense and bluntness of speech.

**Phocis**, a country of ancient Greece, lay n. of Gulf of Corinth. Its territory was mountainous, containing Parnassus. Its history turns largely on the presence within its borders of the Delphic shrine.

**Phœbe-bird**. See **Pewee**.

**Phœbus** and **Phœbe**, titles given respectively to Apollo, in his character of the sun-god, and to Artemis, as the goddess of the moon.

**Phœnicia**, the strip of Syrian coast between the mouth of the Orontes in the n. and Jaffa in the s., where Philistia or Palestine, the land of the Philistines, commenced. Phœnicia was essentially a land of seaports. The rocky slopes were terraced and planted with vines, olives, and other trees, and every available inch of soil was cultivated; but in spite of this Phœnicia was never an agricultural country. It depended for its support upon the sea, and its prosperity was

due to maritime enterprise and trade. The carrying trade of the ancient world passed into the hands of the Phœnicians; they had a monopoly of the precious purple dye, and their ships not only traversed the Mediterranean and Red Sea, but eventually made their way into the Atlantic. The Phœnicians called themselves Canaanites. Their language, 'the language of Canaan,' is practically the same as Hebrew, and the Tell-el-Amarna tablets show that it was spoken throughout Canaan before the Exodus. Sidon was the oldest of the Phœnician cities. If Justin is to be trusted, Tyre was founded by refugees from Sidon after the sack of the latter city by 'the king of the Ascalonians.' Tyre, however, was itself of considerable antiquity. The temple of Melkarth, its patron god, was built 2,300 years before Herodotus, and in the Tell-el-Amarna tablets its riches are already celebrated. The city was at that time still confined to an island; and a century later, an Egyptian papyrus, which describes the adventures of a tourist in Canaan in the reign of Rameses II., states that drinking water was brought to it by boats. The letters from Phœnicia in the Tell-el-Amarna collection are, like the letters from other parts of W. Asia, in the Babylonian language and script. But for many centuries the Babylonian kings claimed supremacy over Canaan and Syria, 'the land of the Amorites,' as it was termed; and the culture of Babylonia, including its language and literature, laws and theology, made its way to the shores of the Mediterranean.

Phœnician religion was characteristically Semitic. Each locality had its Baal or divine 'lord,' who was supreme over the other deities of the place. He was absolute master of the locality and its inhabitants. All good things were given by the Baalim; pain and misfortune were the consequences of their anger. Hence their worshippers sought to propitiate them by every means in their power. Parents sacrificed their first-born, and unmarried ladies prostituted themselves in the temples. The Baal was represented in human form, and though he acquired in time a solar character, his visible symbol being the sun, he ever remained a sort of divine king whose subjects were called upon to offer him all they had. Phœnician art was a combination of that of Babylonia and Egypt modified in a special way. It is to the Phœnicians that we owe the alphabet,

which they received possibly from Arabia in the 11th or 12th century B.C., and after adapting it to the expression of their language, handed it on to the Greeks, along with the names they had given to the letters. The manufacture of variegated glass, which was derived from Egypt, became one of the principal industries of Tyre; while Sidon was famous for its fine linen, the art of making which was probably a Babylonian invention. But the industry to which Phœnicia originally owed its wealth and fortune was that of dyeing with purple, obtained from the murex, or purple shell-fish. Factories and their colonies were established for the sake of trade wherever there was a good harbor and the chance of a market, and Phœnician settlements grew up not only in the islands and on the coasts of the E. Mediterranean, but also in Sicily, Sardinia, and the northern coast of Africa.

**Phoenix**, a southern constellation, located between Grus and Eridanus by Bayer in 1603. The principal stars form a curved line.

**Phoenix**, in ancient Greek legend, a son of Amyntor, and king of the Dolopes, who took part in the Calydonian boar hunt; afterwards he fell out with his father, went to Peleus, and became Achilles's tutor.

**Phoenix**, a mythical bird, of which Herodotus tells us that it appeared at Heliopolis in Egypt once every 500 years, when it buried its father in the sanctuary there, enclosing its body in an egg, made of myrrh. The bird was like an eagle, with feathers partly red and partly golden. According to legends the dying phoenix cast itself into flames, out of which the new one arose. Consult Wiedemann's *Religion of the Ancient Egyptians*.

**Phoenix**, city, capital of Arizona, is centrally located in the Salt River Valley, where 325,000 acres of fine farming land are under irrigation, mostly from the Roosevelt Dam. A large trade is carried on in fruits, olives, hay and feed crops, vegetables, and dairy and poultry products. The city was settled about 1875 and incorporated in 1881; p. 65,414.

**Phoenixville**, borough, Pennsylvania, 23 miles northwest of Philadelphia. Valley Forge is 4 miles distant. Industrial establishments include large iron mills, blast furnaces, important bridge and boiler works, and manufactures of boxes, matches, silk, underwear, and hosiery; p. 12,282.

**Pholas**, a genus of burrowing bivalve molluscs, whose members are known as piddocks or date shells. Like all burrowing bivalves, they have gaping shells, which are open at both ends, and have accessory plates of lime attached. In Southern Europe and in some other countries these molluscs are eaten, or esteemed valuable as bait.

**Phonetics** is the science of speech sounds, and deals with their character, relations, combinations, and changes. Speech sounds are best defined in terms of the manner in which they are produced by vocal organs. Acoustical descriptions in which words such as 'soft' and 'flat' are employed convey no clear conception of the character of sound, and are altogether valueless as aids to pronunciation. A description of the position occupied by the vocal organs when a particular sound is formed provides a definite means of comparison with other sounds, and is also an indication of how an unknown sound may be produced. The physiology of the vocal organs is an important auxiliary in the study of phonetics. Speech sounds may be broadly classified according as the breath by which they are produced streams through the mouth channel or the nose channel, or through both together. Several additional factors also contribute to the production of distinctive sounds. The part played by the glottis, the opening between the vocal cords, is important. The manner in which the lips are set is another modifying influence in the production of speech.

What follows is a summary statement regarding the principal groups of speech sounds. *The stop consonants* are formed by cutting off the stream of breath and suddenly releasing it again. They include *p, t, k, b, d, and others*.

*Spirant consonants* are also known as fricatives or continuants. Corresponding to the stop series is a spirant series, *f (wh), th, kh, v (w), dh, gh*, in which the stream of breath is only checked, not stopped, by the lips, point of the tongue, and back of the tongue respectively. Another set of spirants are *the sibilants, s, z, sh, and zh*. *s* is voiced *s*, and *zh* voiced *sh*. The blade of the tongue (Sweet's expression for the part immediately behind the point) seems to be prominent in the formation of *s*, but other factors also help to determine its character. There is a whole series of *s*'s, almost parallel to the *th* series, with which it is frequently confused by speakers whose

native language contains no *th*. *sh* is defined by Sweet as 'point-blade.' *L* and *r* are closely related in the manner of their formation, and therefore also in the history of language. The sounds denoted by *r* are a somewhat miscellaneous group. Those who are familiar with trilled *r*'s regard the trill as their most important feature. *Nasals*.—In the formation of nasal sounds the mouth passage is closed by the lips (*m*), the point of the tongue (*n*), or the back of the tongue (*ng*), and the breath escapes through the nostrils. There are varieties of nasals similar to the varieties observed in the case of the stop consonants. In particular the front and back varieties of *ng* are to be distinguished. Voiceless *m*, *n*, and *ng* occur regularly in Welsh. *Vowel Sounds*.—The factors which determine the character of vowel sounds are chiefly the point of articulation by the tongue and the height to which it is raised; further, the part played by the lips and the nasal passages. Some have made tables including 72 vowel sounds, divided into back vowels; front vowels; mixed vowels; and nasal vowels. Consult L. Soames' *Introduction to English, French and German Phonetics* (rev. by W. Vietor), for a beginner; E. Scripture's *Elements of Experimental Phonetics*; Tilly's *The Problem of Pronunciation* (1925); Prendergast's *Good American Speech* (1930).

**Phonograph**, a term generally applied to any machine which records and reproduces sound, though it is sometimes restricted to the particular type of machine developed by Edison and his associates. There are two classes of sound recording machines: the cylinder machine, in which the sound is recorded upon a wax cylinder, and the disc machine, in which a flat circular disc is substituted for the cylinder. The phonograph and graphophone make a verticle record of the sound waves, while the gramophone records the sound in horizontal curves. The word phonograph is generally used to include both types. The first real attempt at recording sound was made by Leon Scott, a Frenchman who, in 1857, invented his phonautograph, a machine which bore a striking resemblance to the early phonographs; but the sound he recorded could not be reproduced. Cros, another Frenchman, wrote an article telling how Scott's machine could be made to reproduce sound in 1877. In the same year Thomas Edison produced a machine that was successful both

in recording and reproducing sound, and his phonograph was the first to be patented and given to the world. In the same year, also, a German scientist, Emil Berliner, invented the first disc machine, which he called a gramophone. The use and application of the phonograph is rapidly increasing. Men of affairs in increasing number dictate their correspondence to a talking-machine, and the record thus made is given to the typist, who transfers it in turn to the typewriter. Machines for this purpose, requiring inexpensive and temporary records, are of the cylinder type. For most other purposes the disc machine is used. Institutions such as the British Museum, the Académie des Sciences in Vienna, and the Smithsonian Institution in Washington are making valuable collections of famous original records.

**Phonolite**, or **Clinkstone**, a volcanic rock, consisting essentially of nepheline and sanidine feldspar. It usually contains also some form of augite, hornblende, or biotite.

**Phorcus**, **Phorcys** or **Phorcyn**, a sea deity to whom a harbor in Ithaca was dedicated. By Hecate he was the father of Scylla.

**Phororhacos**, an enormous running bird of prey now extinct. Skeletons are found in Patagonia which show that it was about eight feet in height and had a skull larger than that of a horse.

**Phosgene Gas**, carbonyl edichloride or carbon oxychloride ( $\text{CO Cl}_2$ ), a colorless gas with a penetrating odor, soluble in acetic acid and benzene, and rapidly decomposed by water. Phosgene gas was one of the most widely used of the poisonous gases employed during the Great War (1914-18). It causes a burning choking sensation and if inhaled in sufficient quantities causes death. It is also used in the dyestuff industry.

**Phosphates**, the salts obtained from phosphoric acids. They are found in both animal and vegetable life but are most important as a mineral product. In all animal life phosphates occur in various forms, such as sodium phosphate in the fluids and soft tissues, particularly in the bile and urine, and as calcium phosphate in the bones. Phosphate of magnesia is found abundantly in vegetables and cereals. Phosphates occur as an original constituent in metamorphic rocks, in veins of igneous rock, in sedimentary rocks as organic fragments, and in bone beds mixed with phosphatic materials.

There are two types of phosphate, known as hard-rock phosphate and soft-rock phosphate. Most of the phosphate rock in the United States is manufactured into acid phosphate for fertilizing purposes, but there is a constantly growing demand for raw rock phosphate, freely ground, to be applied directly to the fields. Phosphate rock is also used for the manufacture of phosphorus. A large amount of phosphate rock is employed in the baking-powder industry. Consult Wyatt's *Phosphates of America*; *The Mineral Industry during 1918*, edited by Rouse; *Phosphate Rock* (publication U. S. Geological Survey).

**Phosphatic Diathesis**, a condition in which, owing to some defect in the digestive and assimilative process the urine turns more or less milky, not being sufficiently acid to keep the phosphates in solution.

**Phosphor Copper**, a substance composed of copper containing about 10 per cent of phosphorous.

**Phosphorescence**. Among plants the phenomenon of phosphorescence or luminosity is rare. It is probably confined to certain bacteria, to which may be attributed the phosphorescence of many decaying substances, notably fish; and to some fungi which attack trees and produce the luminosity of rotten wood. Phosphorescence is very common among marine animals. In terrestrial animals it is best marked in insects, where it is apparently always associated with sex, and is absent in land vertebrates.

Physically, phosphorescence is that form of luminescence in which a body which has been exposed to light and then placed in the dark emits light for a greater or less period. With some substances the emission of light continues for some time after removal from the source; but with others, by far the greater in number, the phosphorescence is momentary. Phosphorescence is affected by temperature; thus, warming up a surface covered with luminous paint increases its luminosity.

**Phosphoric Acid** includes several distinct compounds in which phosphoric anhydride,  $\text{P}_2\text{O}_5$ , is combined with different proportions of water; though when used without prefix, it generally implies ordinary or orthophosphoric acid,  $\text{H}_3\text{PO}_4$ . It is a viscous liquid that crystallizes with difficulty, and mixes in any proportion with water to form a clean-tasting sour liquid. Orthophosphoric acid is used to a small extent in medicine,

and as a stage in the preparation of other compounds of phosphorus.

**Phosphorite**, an impure massive form of apatite, mined for the calcium phosphate it contains, and forming one of the chief sources of phosphorus and its compounds, and of artificial manures.

**Phosphorous Acid**,  $\text{H}_3\text{PO}_3$ , is formed by acting on phosphorous trichloride with water or hydrochloric acid, and can be obtained crystalline by evaporating the solution. It acts as a powerful reducing agent.

**Phosphorus**, P, 31, an element, which, though never found free in nature, is widely distributed in combination. Thus, it is an essential ingredient of the protoplasm of all living cells, and is present in well-marked amounts in nervous tissue and bones. Phosphorus is also widely distributed in minerals. Ordinary phosphorus is a waxy solid that is colorless when pure, and forms brilliant, highly refractive crystals when sublimed in a vacuum, though usually it is more or less colored pale yellow or buff from the action of light or the presence of impurities. Phosphorus is most marked chemically by the readiness with which it is oxidized: thus, it glows and gives off fumes of a garlic odor when exposed to the air, and the action which thus takes place often warms it up sufficiently to cause inflammation, which takes place a few degrees above its melting point, and with exceptional readiness if the phosphorus is in the finely-divided state obtained by evaporating its solution in carbon disulphide. When set on fire in the open air, or oxygen, it burns with a dazzling white light. Ordinary phosphorus is very poisonous, even small doses causing gastrointestinal irritation; and though this may pass off, it is followed by fatty degeneration and internal hæmorrhage, which is usually fatal. Burns caused by phosphorus are very troublesome to heal. Ordinary phosphorus is mainly employed in match manufacture. Other uses of common phosphorus are for the manufacture of vermin-killer, the preparation of phosphor-bronze, to a small extent in medicine, and in the preparation of organic compounds.

**Photius** (c. 820–c. 891), patriarch of Constantinople. Photius, through a council held at Constantinople, effected the temporary withdrawal of the Eastern from the Western Church.

**Photochemistry** deals with those chemical changes that are brought about or acceler-

ated by the action of light—*e. g.* those that determine the growth of green plants, are instrumental in the act of vision, in the bleaching of colors, and are the basis of the various photographic processes. Most photochemical actions are primarily decompositions: thus, with chlorine and hydrogen mixtures, from experiments on which most of the exact photochemical data are derived the first step in the action is probably the disintegration of the chlorine and hydrogen molecules into atoms, which are then free to combine to form hydrogen chloride. With elements such as yellow phosphorus, which is converted to the red variety, and in the formation of the latent photographic image, the nature of the action is not so clear, but probably indicates a molecular rearrangement. The presence of water and oxygen, and the formation of hydrogen peroxide (the production of which in sunlight has been shown to hinder putrefaction, and has probably much to do with bleaching), have very important bearings on the chemical action of light.

**Photoengraving.** See **Process Work**.

**Photography** is the art of preparing permanent representations of objects by means of the light they emit or transmit. The first photographs produced in the camera were made by Daguerre and Niepce (c. 1839), who sensitized a polished silver plate with the fumes of iodine, exposed it in the camera, developed it by means of mercury vapor, and fixed the resulting image by dissolving the unacted-on iodide with potassium cyanide. The next advance was made in 1841, by Fox Talbot, who invented the 'calotype' process. In 1864 Bolton and Sayce introduced collodion emulsion. A still further advance was made by Bolton in 1874, when he introduced a washed collodion emulsion. This advance not only gave much higher speed, but the raw emulsion and plates coated therewith had much greater keeping power and it did much to popularize photography. The gelatino-bromide dry plate was invented in 1871 by Maddox, and greatly improved in 1878 by Bennett. The camera in which the image is impressed on the sensitive surface is a light-tight box in which the plate is fixed in such a position that an image of the object to be photographed is projected on to it by a lens or pinhole. Development is generally carried out in a 'dark room' lighted by rays that do not appreciably affect the plate—such as red light for ordinary plates—

and is carried on until an image of sufficient density is obtained. The image is then fixed by immersing it in a solution of sodium hyposulphite. Prints are then obtained from the negative by placing it in front of a piece of sensitized paper and exposing to light. The light passes through the negative most readily in the clearer portions, thus darkening the paper most at the places where little light fell on the plate when in the camera, and hence reproducing the shadows of the object. Similarly the high lights of the object produce opacity in the negative, and this gives light places on the print.

Within the last few years by the discovery of a new class of dyes, the so-called 'isocyanines,' the sensitiveness of the silver salts for the red end of the spectrum has been so much increased that the 'panchromatic' plate, sensitive to all colors, has placed an absolutely new power in the hands of the photographer both for artistic and scientific work. If suitable filters, that is, scientifically adjusted films of gelatin stained with aniline dyes, are inserted between the lens and the sensitive surface, it is possible to obtain a perfectly true representation of the relative brightness of different colors. This discovery may be practically said to have been one of the biggest advances since the discovery of photography. Photography has become the handmaid of science and commerce. In legal cases photographs of objects and places are frequently introduced into court for the purpose of aiding the jurors to a more intelligent understanding of the facts of a case. In astronomy, photographs of the heavens are furnishing extremely valuable data for research and investigation; while in biology and zoology the art is invaluable in the study of the life, haunts, and habits of wild animals, reptiles, and insects. Photographs of micro-organisms have been exceedingly useful in medicine, and photographic exhibits play an important part in campaigns for the promotion of health and the prevention of disease. Photography as an adjunct to advertising is of constantly growing importance; while the large number of illustrated catalogues issued periodically bear witness to its rôle in the business of selling. With the increasing demand for photographs for publicity purposes, a considerable number of companies have been incorporated for the sole purpose of securing and supplying photographs of prominent persons, places, and objects, for publishing and advertising

houses. The possibilities of the field of television have by no means been explored, but it is along these lines that many photographic experiments are now being made. The application of photography in military practice is of special interest. In all wars previous to World War I photography had been largely in the hands of civilians, doing their work for profit and in haphazard manner. While there were a few authorized photographers in the Signal Corps, there was no separate corps of photographers in the U. S. Army until its entrance into the European War in 1917. Present-day military photography falls into two grand divisions: photography in the air, and photography on the ground. Of these the most important is *aerial photography*. An important function of the Aviation Services of all armies is carrying military photographers over the lines so that they may make record photographs revealing enemy works. By 1918 an automatic camera had been evolved that, once its mechanism was set going, did not need further attention from the operator. In World War II photography in its many phases played a very important role. Consult *Journal of the Photographic Society of America*; C. E. K. Mees, *The Theory of the Photographic Process*. See MOVING PICTURES.

**Photometry** is the measurement of the relative amounts of light emitted by different sources, by comparing them with a suitable standard. The ordinary unit of measurement used in the United States and Great Britain is the candle-power, which is the light produced by a standard candle of weight six to the pound, burning 120 grains of spermaceti wax per hour. There are many different kinds of photometers. Among the simplest are the Rumford and the Bunsen. Consult Fleming's *Handbook for the Electrical Laboratory*; Palaz's *Industrial Photometry* (Eng. trans.); Stine's *Photometrical Measurements*; *Record of the International Congress of Physicists*, 1900.

**Photophone**, an instrument invented by Graham Bell and Sumner Tainter, by which sounds, including speech, can be transmitted to a distance by the agency of light.

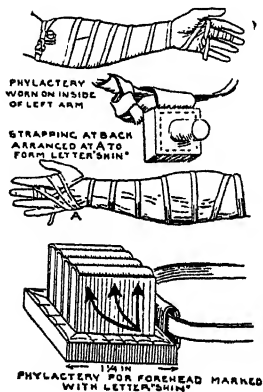
**Photosphere**, the sun's radiating surface, probably composed of incandescent clouds floating in a less luminous medium.

**Phrenology**, a pseudo-science, whose devotees claim that the external features of the skull furnish an index to the mind and character. Franz Joseph Gall, a German,



enumerated in 1796 some 30 faculties of the human mind. He believed the configuration of the skull to correspond closely with that of the brain, and declared that mental characteristics are recorded in relief upon the outer surface of the cranial bones. Dr. Bernard Holländer in 1901 published a work, *The Mental Functions of the Brain; or, the Revival of Phrenology*. The author shows the association of certain types and symptoms of insanity with definite lesions of particular parts of the brain. But Dr. Holländer, instead of reviving Gall's doctrines, gave the word phrenology a new significance.

**Phrygia**, two ancient divisions of Asia minor. (1.) Phrygia the Lesser occupied the n.w. corner of that country, being bounded e. by Bithynia and w. by the Ægean Sea. (2.) Greater Phrygia was inland. The distinction between Greater and Lesser Phrygia only holds good after about 550 B.C. The Phrygians were an Aryan race, akin either to the Greeks or to the Teutons, and migrated into Asia from Thrace. Troy was one of their chief cities; the Trojans of Homer were very possibly of Phrygian race; the fact that he assigns to them Greek names and Greek customs is an evidence of their similarity to the Greeks. They were independent under national monarchs, among whom Gordius and Midas are two names known to fable rather than history, until conquered by the Lydians; then they were



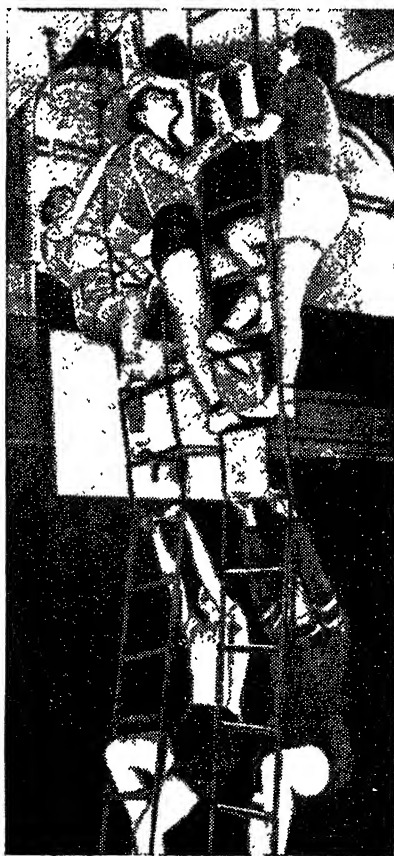
*Phylacteries.*

subject successively to the Persians, Greeks, and Romans. They exercised a great influence on Greek music and Greek religion, especially in regard to orgiastic and mysterious worship, such as those of Dionysus and Cybele.

**Phryne**, famous courtesan of ancient Athens, was a native of Thespiæ in Bœotia.

**Phthisis.** See **Tuberculosis**.

**Phylactery**, a cubical leather box from half an inch to one and a half inches in the side, containing, inscribed on parchment or vellum, Exod. 13:1-10, 11-16, and Deut. 6:4-9, 11:13-21, and worn on the head, or on the left arm (inside, next the heart), during week-day prayers by the Jews, in literal fulfilment of the law. Sometimes they are fastened to the door-post.

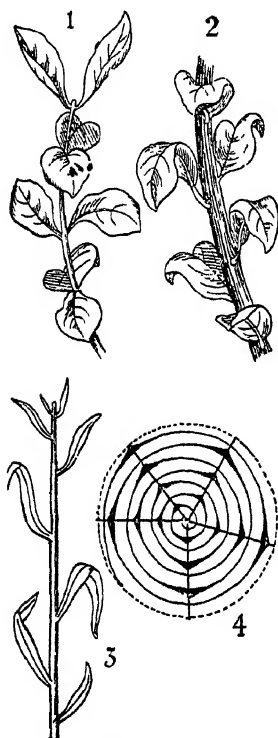


*Physical Training, New York City Schools.*

**Phyllanthus**, a genus of mostly tropical plants belonging to the order Euphorbiaceæ.

**Phyllite**, an extremely fine-grained metamorphic rock, resembling a slate, but containing a large percentage of fine, silky, pale-colored mica, and therefore lying between the slates and the mica schists in classification. It splits readily, and has a shimmering luster on the surface.

**Phyllotaxy**, that branch of vegetable morphology which discusses the modes in which foliage leaves are arranged on the branches of plants.



*Phyllotaxy.*

1. Opposite and decussate leaves.
2. Alternate in five rows.
3. Alternate in two rows.
4. Diagram of 'two-fifths' phyllotaxis.

**Phylloxera** (Greek *phyllon*, 'a leaf,' and *xēros*, 'dry'), a genus of insects belonging to a family (Phylloxerinae) nearly related to aphids and coccus insects, and included within the suborder Homoptera in the order Hemiptera. The most important species is *P. vastatrix*, which has wrought havoc among the vineyards of Europe. It seems to have been discovered in North America about 1854, and in all likelihood was carried thence to Europe, where it appeared about 1863.

**Phylogeny**, a biological term applied to the ancestral history of a group of animals or plants, in contradistinction to *ontogeny*, or the development of the individual. See EMBRYOLOGY; HEREDITY; EVOLUTION.

**Phylum**, or **Phylon**, in biology, the name

for one of the larger subdivisions of the plant and animal kingdoms. The former is usually divided into six phyla—Myxophyta, Schizophyta, Thallophyta, Bryophyta, Pteridophyta, and Spermatophyta. The animal kingdom is usually divided into eight phyla—Protozoa, Porifera, Cœlenterata, Vermes, Echinodermata, Anthropoda, Mollusca, and Vertebrata.

**Physalis**, a genus of herbaceous plants belonging to the order Solanaceæ. They bear violet, white, yellow, or purple flowers, the calyxes of which become inflated during the period of ripening of the fruit. This fruit, as is the case of *P. peruviana*, the Cape Gooseberry, and *P. pubescens*, is edible.

**Physical Education.** See **Physical Training.**

**Physical Geography.** See **Physiography**; **Geography.**

**Physical Society, American**, an association founded in 1899 for the advancement and diffusion of the knowledge of physics; affiliated with the American Association for the Advancement of Science.

**Physical Training**, a branch of education concerned chiefly with developing and training the body. The general aims of physical training are, first, the promotion of health, and, second, the formation of proper habits of action. There are six distinct groups of exercises used in physical training: they are free movements of the arms, legs, neck, and trunk (also known under the name of Calisthenics); movements of the apparatus, such as the horizontal bar, parallel bars, vaulting horse, buck, rings, ladder, ropes, etc.; athletic exercises, such as running, jumping, throwing weights, etc.; combative exercises, such as boxing, fencing, and wrestling; games, such as baseball, football, lawn tennis, golf, basketball, cricket, lacrosse, etc.; and dancing, including various forms, such as classical and folk dancing. Every complete system of physical training includes exercises from all these groups. The various forms of exercise are also classified on the basis of their physiological effect on the body. According to this classification there are light exercises, such as free movements with and without hand apparatus; exercises of strength, such as lifting heavy dumb bells, wrestling, etc.; exercises of speed, such as short-distance running and swimming; exercises of endurance, such as long-distance running and swimming; exercises of skill, such as dancing and Indian club swinging, characterized by complexity of movements and difficulty of execution. The selection and the ar-

range of the exercises chosen are determined by the sex, age, and physical condition of the individuals to be trained. The result which should be secured by a rational system of physical training is to secure a complete education of the body which can be attained only by careful and continuous training from early childhood to maturity.

During the first six years of life, the child's need for exercise is fully satisfied by free play. During the first four years of the elementary school, the physical training of the child consists mainly of free play supplemented by instruction in simple gymnastic games and some of the fundamental exercises. The period of adolescence, from about 10 to 18 years, is by far the most important for the physical training of the individual. The physical training of the individual should be completed when he reaches 18 to 20 years. This does not mean that physical exercise is no longer necessary, for physical activity is essential to health in every period of life. After 40 or 45, the heart and blood vessels become more susceptible to strain, and the muscles and joints lose in suppleness; in consequence it becomes necessary to abandon exercises of strength, speed, and endurance, and to substitute some of the lighter forms of muscular activity. Three systems of physical training, developed in Europe during the 19th century, constitute the basis of modern physical training; they are the British; the Swedish; and the German.

The British system is essentially a system of plays and games which has developed gradually as an expression of the play instinct in the English people. This system is valuable because it gives expression to the normal human instincts for physical activity and competition, but it lacks a scientific basis and is incomplete as a system of physical training. The Swedish system was developed at the Royal Central Institute of Gymnastics, founded in Stockholm in 1813 by Peter Henry Ling. The characteristics of the Swedish system are as follows: Positions are distinguished from movements; every movement is selected for a definite purpose; movements which tend to constrict the chest or require the breath to be held are rejected; definite progression in the character of the movements is made from day to day; all movements are executed to the word of command, as in military drill. The weakness of the Swedish system is due to the too great emphasis given to the neural factor in exercise, the monotony for the rigid 'day's

order' or lesson, and particularly to the omission of all competitive and recreative exercises.

The German system of physical training is one of the oldest and most extensively practiced today. Friedrich Ludwig Jahn is given credit of founding this system. With the cooperation of his friends and pupils, Jahn developed a scheme of physical training which included such exercises as running, jumping, vaulting, and various exercises on newly invented gymnastic apparatus. He made use of every form of exercise which proved interesting. New forms of exercise were added from time to time until the system included games, free movements with and without hand apparatus, heavy gymnastics, running, jumping, climbing, throwing weights, wrestling, and fencing.

Physical training has been developed far more extensively in the United States than in Europe. In the sixties, the colleges of Harvard, Yale and Amherst built gymnasias; rowing, baseball, and athletics were introduced in a number of colleges; Dr. Dio Lewis inaugurated a movement in favor of light gymnastics; and the Germans organized gymnastic societies and founded a school for training teachers. The new movement developed slowly during the first few years, but since that time the development has been very rapid. Abundant resources and freedom of thought and action have made possible the development of a national system of physical training which is rapidly taking its place as an integral part of American education. That the leadership of the United States in physical training and athletics is recognized by foreign nations is shown by the large number of commissions sent by foreign governments to study American institutions and methods of physical training.

One of the direct results of the popular interest in national preparedness aroused in the United States by the great European War of 1914 was the passage by the legislature of the State of New York of 'An Act to amend the education law, in relation to courses of instruction in physical training and discipline in the schools of the State.' The chief provisions of this act are as follows: After Sept. 1, 1916, all pupils above the age of 8 years in all elementary and secondary schools shall receive as part of the prescribed courses of instruction therein such physical training as the Regents, after conference with the Military Training Commission, may determine, during periods which shall average at least 20 minutes in each school day. Pupils above such age at-

tending the public schools shall be required to attend upon such prescribed courses of instruction.

Similar courses of instruction shall be prescribed and maintained in private schools in the State, and all pupils in such schools over 8 years of age shall attend upon such courses. Whenever the Regents shall adopt recommendations of the Military Training Commission in relation to the establishment in elementary and secondary schools, of habits, customs, and methods adapted to the development of correct physical posture and bearing, mental and physical alertness, self-control, disciplined initiative, sense of duty and spirit of cooperation under leadership, as provided in the military law, the Regents shall prescribe and enforce such rules as may be necessary to carry into effect the recommendations so adopted. The plan devised by the Military Training Commission was adopted by the Regents on Oct. 19, 1916. Its main provisions include:

Individual health examination and personal health instruction; setting-up drills of at least two minutes' duration at the beginning of each class period, or at least four times every school day; talks on hygiene; supervised recreation, organized play, and athletics; gymnastic drills, 60 minutes a week under direction of special teacher of physical training. See GYMNASTICS; TRACK AND FIELD ATHLETICS; MILITARY TRAINING IN THE SCHOOLS.

**Physician.** See **Medical Practitioner.**

**Physicians, Royal College of,** the principal chartered medical body in England, was founded through the instrumentality of Thomas Linacre, who obtained, by his interest with Cardinal Wolsey, letters patent from Henry VIII., dated 1518.

**Physick, Philip Syng** (1768-1837), American physician, called 'the father of American surgery,' was born in Philadelphia, Pa. In 1805 he was appointed to the newly established chair of surgery at the University of Pennsylvania, and in 1819 became professor of anatomy, retaining this position until 1831. In 1825 he was elected first American member of the French Academy of Medicine. Many novel instruments and improved methods were introduced by him into surgical work.

**Physic Nut** (*Curcas*), a genus of plants of the order Euphorbiaceæ, having alternate, stalked, angled or lobed leaves, and corymbs of flowers on long stalks. The seeds abound in an acrid fixed oil which makes them powerfully emetic and purgative, or in large doses poisonous.

**Physics**, that department of science which is concerned with the fundamental laws of the material universe. These laws are best studied by means of the simpler configurations which constitute inanimate nature; but the same laws are found to hold for organic nature, although the complexities of function and structure associated with life add enormously to the difficulty of following in detail the action of these physical laws. The broad distinction between chemistry and physics is that the former science considers more particularly the molecular changes of matter; but the two branches of science overlap, so that it is not possible to draw a clear line of division between them. The various branches of physics are treated under separate headings, such as HEAT; LIGHT; SOUND; ELECTRICITY.

**Physiocrat**, the name now usually applied to the French *économists* of the 18th century. The founder and leader of the school was François Quesnay (1694-1774), a French physician and economist. This school held that land is the source of all wealth, and agriculture the only industry that increases wealth. Since agriculture provides the sole revenue of a country, it was held that the state should claim from the landowner and the farmer all the contributions it required. See ECONOMICS.

**Physiognomy**, the art or science of judging of the character from the external appearance, especially from the countenance. The art is founded upon the belief, which has long and generally prevailed, that there is an ultimate connection between the features and expression of the face and the qualities and habits of the mind. See CRIMINOLOGY; ANTHROPOLOGY.

**Physiography**, a term understood to involve a compendious discussion of gravitation, heat, the composition of the crust of the earth, the movements of the sea, the phenomena of the atmosphere, and many cognate subjects, treated in this work under separate heads. See EARTH; GEOGRAPHY; GEOLOGY; GEOMORPHOLOGY; GEODYNAMICS; ATMOSPHERE.

**Physiology**, as contrasted with Anatomy, which deals with organic structure, is concerned with the functions of living organisms, and with those laws or principles upon which vital processes and life itself depend. While all living organisms, be they plants or animals, are ultimately composed of inorganic matter, they are sharply differentiated from the non-living by the possession of certain faculties or processes. During life the organism is a center

for the transformation of energy, and it responds to certain outside influences or stimuli. The small mass of protoplasm known as *amœba* in virtue of life exhibits growth, maintenance, and reproduction, and these three activities are common to every plant and to every animal. Animals, as a rule, have in addition the faculty of locomotion, and both the higher plants and animals pass through a stage of decay terminating in death.

Every living being commences life as a minute mass of protoplasm, which is fundamentally the same whether the organism belongs to the animal or to the vegetable kingdom. In the course of development the cells are differentiated in diverse directions, and to varying degrees. Some animal cells built up such a product as bone; certain cells of the higher plants elaborate chlorophyll, a product of protoplasm, by means of which these plants are enabled to fabricate their food out of inorganic materials. Animal cells, again, for their food require substances already organized by pre-existing cells. In both cases the cells elaborate the raw food matter into more complex substances before they assimilate it.

By the division of labor which results from aggregation of cells a great economy of energy is effected. Cell anabolism probably builds up a series of bodies which have a katabolic tendency—that is to say, they are liable to undergo a splitting-up process by means of which the molecular groups are rearranged and energy is evolved and manifested in heat and motion. A certain group of substances, some of which are constantly present in every living cell, is known as proteid. These proteids are not themselves liable to spontaneous explosion, but it is not unlikely that the addition of oxygen may temporarily unite some of them into a new compound which is readily decomposable. Such a view explains the necessity for oxygen as well as the constant production of carbon dioxide by the living cell. The sources of the proteids of the human body are previously-formed proteids, fats, and carbohydrates from vegetable and from animal food; and should the materials supplied be more than sufficient for the needs of the moment, the living cell can store them up for future use. In the absence of sufficient food supply the tissues live upon themselves, the more essential performing work and producing heat at the cost of the less essential.

Alongside the muscular system as a liberator or spender of energy must be placed the nervous tissues. Before leaving the body the nerv-

ous form of energy is wholly or almost wholly transformed into heat. Heat and muscular work may be regarded as practically the sole forms in which energy leaves the mammalian body, and nerve and muscle may be regarded as the chief tissues by which energy is expended. All the other tissues are subservient to these two supreme developments of protoplasm. The integumentary tissues clothe and protect the muscles and nerves, and also act as excretory organs. The respiratory system provides the oxygen necessary for muscular and nervous activity, while the alimentary system, with all its accessory glands, supplies fresh energy by the ingestion and assimilation of food stuffs containing new stores of potential energy. The circulatory systems of blood and lymph convey oxygen and pabulum to these all-important tissues as well as to those of secondary importance in the economy, and they remove such products of katabolism as are deleterious or of no further use to the active cells. They also carry the waste products to the excretory organs, whose function is the discharge of useless or effete material formed by the splitting up of the complex proteids.

In considering the phenomena of growth, certain cells, the leucocytes of the blood and the wandering connective tissue corpuscles, may be looked upon as embryonic residues of undifferentiated *amœboid* organisms. Comparatively simple cells such as these grow and reproduce their kind in the same fashion as an *amœba*. In cells more highly differentiated than white blood and connective tissue corpuscles reproduction is less simple and easy; but even muscle fibres multiply by fission. Among the higher vertebrates, nerve cells, which are the most highly specialized of all, lose in early embryonic life the faculty of multiplication. Their number is irrevocably fixed early in the existence of an individual. But they preserve the power of individual growth to a remarkable extent. For the continuation of life a process of reproduction is necessary. Throughout the entire organic world this process consists essentially in the detachment of a part of the parent. In the higher plants and animals reproduction is sexual, the female element undergoing development only after fusion with the male element. From the food and energy supplied by the parent the embryo builds up its tissues until it is fit for separate existence. The special form which the individual ultimately assumes depends upon qualities inherited by the embryo in the parental elements. For the physiological details of human

tissues, organs, and functions, see such articles as CIRCULATION OF THE BLOOD, DIGESTION, LUNGS, REPRODUCTION; for vegetable physiology, see PLANTS.

**Phytelephas**, a genus of palms, of which the most important species is *P. macrocarpa*, the vegetable ivory tree.

**Phytophthora**, a group of parasitic fungi, of which much the most important species is *P. infestans*, the cause of the potato disease.

**Piacenza**. Town, capital of the province of Piacenza, on the r. bk. of Po. Among the churches is the cathedral, dating from the 12th century. The church of San Sisto (1499) formerly contained the famous Sistine Madonna by Raphael. Founded as a Roman colony at the same time as Cremona, Placentia, as it was then called, was destroyed by the Gauls in 200 B.C. Ecclesiastical councils were held here in 1095 and 1132. It formed part of the duchy of Parma, until incorporated in 1860 with the kingdom of Italy; p. 43,277.

**Pianoforte**. This instrument was invented about 1710 by Bartolommeo Cristofori (1651-1731), a harpsichord maker in Florence. It differs essentially from its now practically obsolete precursors—the harpsichord and the clavichord, in having its strings set in vibration by hammers. For many years after its invention the piano was only made in the large horizontal wing or tail form, which was that used for harpsichords. With modifications to suit various requirements, this is still the most important form of the instrument, and bears the name of 'grand.' Upright pianos are thought to have been first made by C. E. Friederici of Gera in Germany. Hawkins was the first to adopt overspun strings for the bass, and to construct a complete iron frame. Thomas Loud (1802) introduced diagonal stringing in upright pianos.

By varying the proportions and adjustment of parts, makers can produce differences in tone, power and touch; but certain essential parts are common to all pianos. Besides the case there are the 'frame,' which sustains the tension of the strings; the 'sounding-board,' which is the voice of the instrument; and the 'action,' which is the mechanism by means of which the strings are set in vibration and the tone is controlled. The frame is now generally of iron, cast in one piece. At one end of the frame there is a wooden wrest-plank, containing the tuning-pins, into which the strings are fastened, the other ends of the strings being secured to hitch-pins placed round the opposite end and side of the frame. The strings rest upon hardwood bridges,

which are glued to the sounding-board. The latter is an important feature, as its proportions and properties determine to a large extent the tone-producing qualities of the instrument. The strings when vibrating, have their tremors conveyed by the bridges to the sounding-board, which is thus set in vibration. The action is a wonderful piece of mechanism. In the modern piano there are usually only two pedals: that controlled by the right foot, and called the 'loud' pedal, when pressed down removes the dampers collectively from all the strings; the 'soft' pedal diminishes the tone, either by shifting the action so that the hammers strike fewer strings, or by interposing a strip of cloth or felt, or by shortening the length of stroke of the hammers. A third pedal is sometimes introduced; it is used to obtain a sostenuto effect. The strings for a piano are made of cast steel of the finest quality, the smallest string having a breaking strain of about 300 lbs. The earlier pianos seldom had a compass of more than four or five octaves; but as the instrument developed the compass was extended, and since about 1855 the term full compass—though some pianos have a few additional higher notes—has been understood to mean one of seven octaves. Music for the piano is written on the bass and treble staves, and like the organ, the piano is tuned to the system of equally tempered intervals. On February 7, 1936, a piano keyboard was reported that provides a seventeen note octave. It was invented by A. C. Ogolenet, a Moscow musician. His inspiration came from the fact that the present keyboard does not differentiate between sharps and flats. The advantage claimed for this new keyboard is that it will make possible the rendition of Arabic and Iranian music. In musical circles it is felt that progress toward this change had already been made by Alex Saba, a Czechoslovak composer, and also by Rimsky Korsakoff.

**Pianoforte-players, Mechanical.** The first method of playing an ordinary piano by mechanical means seems to have been that invented by Debain of Paris about 1848. The apparatus formed a part of the instrument in which it was used, and it could be introduced into organs and harmoniums as well as into pianos. Debain's invention has been largely superseded by a system of mechanism controlled by pneumatic action. The musical notation of the composition which the instrument performs is represented by perforations made in a scroll of tough, strong paper wound upon

a spool. The instrument is furnished with several little bellows originally worked by pedals, as in playing the harmonium. The more modern instruments are entirely self-contained and are run by electricity.

**Piarists**, or '**Fathers of Pious Schools**,' a religious congregation for the education of the poor, founded at Rome by a Spanish priest, Joseph of Calassanza, in 1617, confirmed by Gregory xv., and chiefly active in Poland and Austria.

**Piassava**, or **Piassaba**, a name applied to either of two Brazilian palms—*Attalea funifera* (see COQUILLA NUT) and *Leopoldinia piassaba*—and to the fibre obtained from their leaves. It is exported in considerable quantities, to be employed in the manufacture of brooms and brushes.

**Piastre**, a silver coin used in Turkey and Egypt, worth between four and five cents in United States money. In history it was a silver coin of Spain worth about a dollar, and familiar in historical romance as the 'piece of eight,' a name which refers to the subdivision of its value into eight silver *reals*.

**Piahy**, state of Brazil, is bounded on the n. by the Atlantic Ocean, and on the n.w. by the state of Maranhão, from which it is separated by the river Parahyba. Its area is 116,520 sq.m. The surface is mostly a plain, and consists chiefly of rich pastures on which large herds of cattle are reared. Cotton, tobacco, rice, rubber, and sugar are cultivated. The capital is Therezina; p. 809,508.

**Piave**, river, N. Italy, rises in the Carnic Alps, flows s.e. between the Dolomites and the Venetian Alps, then bends in an abrupt right angle to the s.e. across the plain to the Gulf of Venice. The Piave has from the beginning of time been the first important water barrier of Italy on the e. Its lower course was the scene of bitter fighting during the Great War.

**Piave, Battle of.** During the Great War (1914-19), the Italian Army took its stand at the Piave following the retreat from the Isonzo in November, 1917. At that moment the outlook for Italy was dark. The loss of Venice would compel the Italian Navy to fall back four or five hundred miles to a base at Brindisi. The Adriatic would thus become an Austrian lake; the Italian coastal towns would be the prey of enemy warships, and the Mediterranean infested with submarines. At this critical moment occurred the fruitful Conference of Rapalle. Messrs. Lloyd George, Clemenceau and Orlando in joint session with their military advisers settled the vexed question of what

support, economic as well as military, Italy might expect from Great Britain and France, and made the Neapolitan General Diaz Commander-in-Chief of the Italian armies with General Badoglio as Chief of the General Staff. By Nov. 6 the rearguard of the Italian Third Army was safely over the Lower Piave and the Duke of Aosta was prepared to stand fast against Boroëvic and Otto von Below. At this juncture the river was called upon to play an active part in the discomfiture of the invader. On Nov. 16 the floodgates of its canalized portions were thrown open, and the marshlands inundated to the sea. Nevertheless, by Nov. 18 the Austrians possessed two more bridge-heads on the Lower Piave. None of these, however, could be used to advantage, for near the coast the Italian infantry was receiving valuable assistance from the marines, and the big guns of the monitors were cooperating with the land batteries. Italy could, therefore, afford to heave a sigh of relief, and Germany, recognizing a protracted stalemate, withdrew her Fourteenth Army under Von Below.

With the coming of summer it became vital for Austria to assume the initiative with or without German aid. By June 17 the Austrians had thrown 14 new bridges over the river from Cape Sile up to the Montello, the northeastern half of which was in their hands. Nearly 100,000 men were across the Piave, and victory seemed within their grasp, when, as if in answer to a prayer, the river rose in flood. The Duke of Aosta achieved marked success by piercing the Austrian center between Fagare and Candelu and recovering the banks of the river at several other points. Before the dawn of June 24 all of the west bank had been recovered by Italy.

**Pibroch** (Gaelic, *Piobaireachd*, 'a pipe tune'), a form of bagpipe music, generally of a warlike character, including marches, dirges, etc.

**Picardy**, an ancient province of N. France, comprising the present department of Somme, and parts of Aisne and Pas-de-Calais, the inhabitants of which still call themselves Picards. Amiens was its capital.

**Picaresque.** See **Novel**.

**Picasso**, **Pablo** (1881), Spanish post-impressionist painter, the founder and leading exponent of the Cubist movement, born in Malaga. After various changes in style, he developed a purely geometrical method, which he handles with great technical facility. According to his own statement, his works are of a psychical rather than a physical nature,

his aim being to produce a pictorial equivalent of the emotions inspired by nature, not to perpetuate its external aspects. See IMPRESSIONISM.

**Picayune**, a name derived from the Carib language, and used in Louisiana for a small coin worth  $6\frac{1}{4}$  cents, current before 1857.

**Piccard, Auguste** (1884- ), Belgian physicist. In 1932 reached an altitude of 54,120 ft. in a balloon.

**Piccard, Jean** (1884- ), Am. physicist, twin brother of Auguste, chemical engineer, with explosives as his specialty.

**Pickering, Edward Charles** (1846-1919), American astronomer, born in Boston. He established the first physical laboratory in the United States in the Massachusetts Institute of Technology and carried out valuable researches in light and in the spectra of stars. In 1876-87 he was Phillips professor of astronomy in Harvard, and in 1887 became Pain professor of astronomy. In 1902 he was appointed director of astronomy in the Carnegie Institution, Washington, D. C.

**Pickering, John** (1777-1846), American lawyer and philologist, son of Timothy Pickering, was born in Salem, Mass. He was a founder of the American Oriental Society and its president up to the time of his death, and was president of the American Academy of Sciences. He gave special attention to the languages of the North American Indians and published two works in this connection, besides as Greek-English lexicon.

**Pickering, Timothy** (1745-1829), American statesman, born in Salem, Mass. He participated in the campaign of 1777 against Howe; became quartermaster-general in 1780; and took part in the campaign which resulted in the capture of Cornwallis at Yorktown. He was chosen a delegate to the convention which ratified the Federal Constitution; and in 1789 he was a delegate to the convention which framed a new state constitution. In 1790 he was sent by the government on the important mission to the Iroquois Indians; during 1791-95 was postmaster-general; and in 1795 was appointed secretary of war. During his administration of this office a military school at West Point was established. In 1795 he became secretary of state, an office he continued to hold until May, 1800, when, owing to a quarrel with President Adams, against whom he had secretly been working, he was dismissed. In 1803-11 he was a U. S. senator; and in 1812 and 1814 he was elected to Congress, and in 1817 became a member of the ex-

ecutive council of Massachusetts. Among his published works may be noted *Letters Addressed to the Native American* (1797).

**Pickering, William** (1796-1854), English publisher. The *Diamond Classics* (1821-31) was his first venture. Other series were the *Christian Classics* and the *Oxford Classics*. He adopted the Aldine Press trade-mark, used boards covered with dyed cloths instead of paper for binding, and became famous for the choice delicacy of his work.

**Pickering, William Henry** (1858-1938), American astronomer, born in Boston, Mass. In Peru he climbed to an altitude of 19,500 ft. on Mount El Misti with the object of examining atmospheric conditions at different altitudes. He is the author of: *Visual Observations of the Moon and Planets* (1900); *Atlas of the Moon* (1903); *The Moon* (1903); etc.

**Picket**. A small detachment of soldiers, usually a platoon or section under command of an officer or a selected non-commissioned officer, posted in a convenient position from which, by means of sentinels and patrols, it can preserve an uninterrupted view of the ground to the front and flanks and report promptly any movements of the enemy.

**Picketing**, a term used to designate the practice among workmen on strike of posting men to prevent non-striking workmen from filling the places left vacant in consequence of the strike. Such pickets are usually stationed at the entrance to workplaces, or at point where non-strikers must pass, and endeavor through persuasion to deter the latter from continuing in employment. So long as pickets do not employ force or intimidation, and do not annoy non-strikers by their acts, they are within their rights as citizens. In any important strike, however, it usually happens that some pickets will resort to violence or threats to attain their ends. Hence it has become common for employers to apply to the courts to enjoin strikers against picketing and its attendant unlawful acts.

**Pickett, Elbert Deets** (1885- ) temperance worker, born at Daingerfield, Texas. He studied liquor control in Great Britain and France during 1919 and represented the government at the 16th International Congress Against Alcohol in 1921. He is the managing editor of the *Cyclopædia of Temperance* and the author of *Enemies of Youth*.

**Pickett, George Edward** (1825-75), American soldier in the Confederate service, born at Richmond, Va. At fair Oaks, June 1, 1862, his brigade repulsed the attack of four Feder-



al regiments, and at Gaines's Mill, June 27, 1862, he was so severely wounded as to be incapacitated for duty until late in the year. On July 3, 1863, he led his division in its magnificent charge on Cemetery Ridge at Gettysburg, the failure of which decided the issue of the battle. He commanded the Confederate infantry defeated by Sheridan at Five Forks, April 1, 1865.

**Pickford, Mary** (1893- ), American motion picture actress, born in Toronto, Canada, and named Gladys Mary Smith. After playing in minor parts, she was starred by David Belasco in 1913 as Juliet in *A Good Little Devil*. Her first appearance on the silver screen was in *The Violin Maker of Cremona*. Among her best known pictures are *Stella Maris*, *Pollyanna* and *Kiki*. She married Douglas Fairbanks in 1920. She is now head of the Mary Pickford Company, Hollywood, and the author of *Why Not Try God* (1934). She was divorced in 1935.

**Pickling** consists in preserving fruits or other vegetable products in spiced vinegar.

**Picquart, Georges** (1854-1914), French soldier, born at Strassburg, was appointed to the War Office staff (1883). For his evidence in the Esterhazy trial (1898) he was imprisoned. In 1906, after the reinstatement of Dreyfus in the army, Picquart was appointed brigadier-general, and became Minister of War in the cabinet of Clémenceau. See Joseph Reinach's *L'Affaire Dreyfus* (1898).

**Picquet.** See **Piquet**.

**Picric Acid**, trinitro-phenol ( $C_6H_2O_7$ ) ( $NO_2$ ), a product of the action of nitric acid on many compounds containing the benzene nucleus. It yields explosive salts by the substitution of metals for the hydrogen of the hydroxyl group, and is used both as a dye, and, when consolidated by fusion, as a high explosive for charging shells, under such names as melinite and lyddite.

**Picrite**, a crystalline igneous rock which consists essentially of olivine and augite, but usually also contains iron oxides, a little feldspar, biotite, hornblende, and apatite. Picrites form a subdivision of the peridotites.

**Pictet, Raoul Pierre** (1842-1929), Swiss savant, born at Geneva, where he afterward became a professor. He is chiefly known for his work on the liquefaction of gases.

**Pictor**, a constellation s. of Columbia, formed by Lacaille in 1752. The chief star is of 3.3 magnitude and Sirian quality.

**Picts**, an early race inhabiting the British Isles, ultimately merged in the succeeding Cel-

tic populations. The word was applied by the Romans, in the sense of Latin *pictus*, 'a painted man,' to those tribes who stained themselves blue and green. The Wall of Hadrian, built to repel their inroads, is locally known as the Picts' Wall. But although they were specially associated with the territory that is now called Scotland, they had also colonies in the original Scotia—i.e. Ireland—notably in Ulster. The Irish Picts suffered a great defeat in 557, at the hands of the Owen O'Neills and another Gaelic clan. Eventually the national life of the Picts received its death-blow in 844, when Kenneth MacAlpin established the Gaelic supremacy by his crowning victory at Stirling. See Nicholson's *Keltic Researches* (1904).

**Picture Post Cards.** The fashion of collecting picture post cards originated apparently in Germany, the originators being enterprising hotel-keepers. Then the artists took up the subject in France, Germany, Belgium, Holland, and Italy. The earliest English picture post card in existence bears the date March 18, 1872. Post cards were first used extensively in the United States in 1897.

**Picture-Restoring**, as an art, originated in Venice, the *St. Lawrence* of Titian being a noted specimen. Old pictures are best cleaned by fluid solvents (alcohol), and new by dry friction.

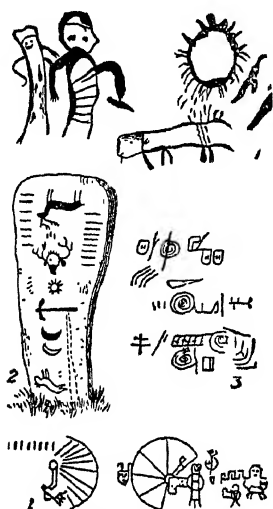
**Picture-writing**, or representation by pictographs and etchings, is the earliest and most natural method of communicating ideas between those who are debarred by distance or other causes from intercourse by means of speech or signals. Among civilized races the pictures of objects became gradually abbreviated into conventional symbols in which the original likeness was almost lost. (For an account of such ideographs and the evolution of letters, see **HIEROGLYPHICS**.)

**Pidgin, Charles Felton** (1844-1923), American author, statistician, and inventor, was born at Roxbury, Mass. Among his many inventions for saving clerical work in preparing statistics are an electric adding and tabulating machine, an electric typewriter tabulator, and a multiple adding or chip system.

**Pidgin English**, a jargon used in commercial dealings with the Chinese, consisting chiefly of English, with some Chinese and Portuguese words, constructed according to Chinese idiom.

**Piedmont** (Ital. *Piemonte*), region, N. Italy; area, 11,336 sq.m. It is traversed by the Po and its tributaries. Its fertile plains produce rice, hemp, chestnuts, fruits, olives, truffles,

and wine. It is also noted for its silk; p. 508,-626. It was occupied by the French in 1796, passed to Sardinia in 1814, and in 1859 to Italy.



Picture-writing.

1. N. American Indian, Wyoming ('one Indian killed another'). 2. Ojibway chiefs' memorial post (the inversion of the figures symbolizes death).
- 3, 4. Mexican inscriptions from Atliaca and from Masaya.

**Piedmonte Plateau Region**, an area of considerable extent, lying between the Atlantic Coastal Plain and the Appalachian Mountains. The underlying rocks of this region are old metamorphic crystallines in complex relationship and structure which were, during the long Cretaceous period of erosion, reduced to almost a plain (peneplain). Subsequent elevation of the eastern continental border caused a retreat of the sea, bringing the Atlantic Coastal Plain into existence and at the same time raising the former peneplain to a height consistent with the term plateau.

**Pierce, Franklin** (1804-69), 14th President of the United States, born at Hillsboro, N. H., Nov. 23, 1804. In 1829 Pierce entered the N. H. legislature, where he served four years, the last two as speaker of the House. In 1832 he was elected a representative in Congress, where he also served four years. In 1837 he succeeded John Page in the Senate, enjoying the distinction of being the youngest member of that body. He resigned his seat Aug. 31,

1842, and resumed the practice of law at Concord. Here he shortly rose to acknowledged leadership of the bar. On the outbreak of the Mexican War in 1846, Pierce was commissioned colonel of the Ninth New Hampshire Infantry, and on March 5, 1847, was made a brigadier-general of volunteers. He went to Vera Cruz, served under Gen. Scott in the campaign against the City of Mexico.

In Jan., 1852, the Democratic state convention of N. H. nominated Pierce for President, but he refused to permit his name to be used. Under the lead, however, of Senator James W. Bradbury of Maine, his classmate and friend, his candidacy was skilfully nursed. In the Democratic national convention at Baltimore, in June, his name did not appear until the 35th ballot; on the 49th ballot he received 282 votes in a total of 288. His popular vote was 1,601,494, against 1,386,580 for Scott and 156,667 for the Free Soil candidate, John P. Hale. The leading events of his administration were the settlement of the Mexican boundary controversy by the Gadsden purchase; the adjustment of a controversy with Great Britain over the fisheries, and the conclusion of a treaty providing for reciprocity with Canada for ten years; a commercial treaty with Japan following upon the expedition of Commodore Perry; the Ostend Manifesto; the reorganization of the consular and diplomatic service; the establishment of the United States Court of Claims; and the completion of surveys for a Pacific railroad. In the Democratic National Convention of 1856 he showed at first considerable strength, but failed of renomination.

**Piers Plowman**. See **Langland, William**.

**Pietà**, a work of art representing the lamentation of the women over the body of Christ after its removal from the cross.

**Pietists**, a party in the Lutheran Church, which appeared in Germany at the end of the 17th century. They laid great stress on the emotional in religion and decried dogmas and ecclesiastical institutions. The extravagance of the pietists brought the movement into contempt, and the name has now an opprobrious signification, implying lack of intelligent belief or mere affectation of piety.

**Pietra Dura**, Florentine inlaid work of the finest kind, formed of stones of extreme hardness, such as agate, jasper, chalcedony, carnelian, amethyst, and lapis lazuli, set in a slab of marble, generally of a dark color.

**Piezometer**, an instrument for measuring the compressibility of liquids. It consists of a cylindrical bulb and tube to contain the li-

quid, which is enclosed by immersing the open end of the tube in some mercury at the foot of a strong glass cylinder.

**Pig** (zoological). The family Suidæ includes the cloven-hoofed ungulate mammals whose domestic races are called pigs, hogs, or swine. They are closely related to the Hippopotomidæ and the Dicotylidæ or peccaries (the latter being sometimes popularly classed with the Suidæ), and the three families together form the group Spinæ. Among the more important characters of the pig family are the presence of an elongated mobile snout, which terminates in a naked disc-like surface bearing the nostrils, and of four complete toes on each foot, of which two touch the ground and the other two, though elevated, are useful in preventing the foot from readily sinking in marshy ground. The animals are more or less gregarious. The flesh of wild pigs is palatable, boar's head being a famous dish. The Suidæ are confined to the Old World, the peccaries to the New.

**DOMESTIC PIGS.**—All known domestic breeds of swine may be divided into two groups: The European hog (*Sus scrofa*) sprung from and resembling the wild boar, and the Asiatic pigs, presumably descended from the Indian wild boar (*Sus cristatus*).

The breeds with a white color, fine bones, thin skin, short legs, and a tendency to fatten at an early age, take these characteristics from the Chinese hogs. The black breeds, like the Essex, obtain their marked characteristics from the Neapolitans. The Yorkshire, the principal English white breed, is divided into three sub-varieties: The Large Whites or Large Yorks, Middle Whites, represented by the Cheshires, and the small Whites or Small Yorkshires, which are considered the smallest and finest of the white breeds. They mature early and fatten quickly. Pigs are raised in all parts of the United States, but the great pork-producing section is the Mississippi valley, where corn is abundant and cheap.

Though prohibited by the Jews, and later by the Mohammedans, pork has been a popular flesh food since earliest times, and constitutes a large part of the diet of many nations. The ham and shoulders are corned and smoked, and fat cuts are cured for salt pork or bacon. Lard, or rendered fat, is an important culinary product. Pig skin is tanned, making a leather popular for saddles, for travelling bags, etc. The bristles are of much value for brush making.

**Pigeon, or Dove,** names applied in the extended sense to all the members of the fam-

ily Columbidae, or restricted to the numerous species of the genus *Columba*, to which belong the domesticated pigeon and the wild pigeons of Western Europe. The family is cosmopolitan, being most abundantly represented in the Malay Archipelago, New Guinea, and the neighboring islands. In all pigeons the body is compact, while the power of flight is usually great, and the habits are generally similar to those of the domesticated form. (See FRUIT PIGEONS.) The three European species have interest for all the world because of their associations. They are the wood-pigeon or cushat (*C. palumbus*), which can be recognized by the broad white patch on each side of the neck, the white band on the wing, and the variously-tinted breast; the rock-dove (*C. livia*), the origin of the domesticated races, distinguished by the white rump and the two black bands on the wing; and the stock-dove (*C. ænas*), in which the rump is gray. Not very different from these is the common American mourning dove (*Zenaidura macrura*), and other tree doves occur in Central America.

**Fancy Pigeons.**—There are a large number of varieties of fancy pigeons, differing widely in outward appearance. The breeding and rearing of pigeons is a profitable hobby with many. Pigeon post was used by the Romans. It is now organized for war purposes by all the European military powers. There are many kinds of homing pigeons, but that generally preferred is a Belgian variety known as the 'Liégeois.' English pigeons are stronger but heavier. All these breeds are believed to be in part derived from the carrier pigeon used as a messenger in remote ages in Persia. A pigeon has been known to carry a message 1,040 m.; but this is quite exceptional, and it is generally held that 100 m. is as much as should be attempted. The rate of flight for distances up to about 150 m. appears to average usually about 37 m. an hour, but decreases for longer distances. The message is written, or microscopically photographed, on very fine paper or film, rolled tightly and enclosed in a goose-quill case, which is then attached by a waxed silk thread to the root of a strong feather in the bird's tail. Homing pigeons require careful selection and breeding, much attention, and regular training. In the German military lofts they are fed twice a day on vetches.

**Pigeon-shooting,** a sport of English origin, can be traced onward from 1793. In America live pigeons were used in many clubs and for the National championship up to about 1900. These laws prohibited wild birds and the clay

targets (known as 'Blue Rocks') were substituted. They are made of pitch and clay, colored blue, are about  $3\frac{1}{2}$  inches in diameter. The Grand American Handicap, is the chief event of the kind during the year.

**Pigments** are the dry powder colors which, when mixed with suitable vehicles, form oil or water paints. They are obtained chiefly from minerals, being compounds of metals, as the oxide, carbonate, silicate, chromate. Other pigments are obtained from the animal kingdom—such as sepia, and from the cuttle-fish. Others again are obtained from the vegetable kingdom—such, for example, as madder, indigo, sap green, and gamboge; while a few are of a nondescript character—such as asphaltum, a kind of pitch.

**Pigments**, of animals. See **Color of Animals**.

**Pig-sticking**, or wild-boar hunting, a sport practised in India, Germany, N. Africa, New Zealand, and other countries. The pig-stickers are mounted on horses, and carry a spear, about eight feet in length, which is used with an underhand action.

**Pika**, or **Tailless Hare** (*Lagomys*) a genus of small rodents related to the hares and rabbits. In appearance pikas resemble guinea-pigs, being about the same size. Typically mountain forms, they are abundant in the Rocky Mountains (the cony, or little chief hare, *L. princeps*) and in the Himalayas.

**Pike** (*Esox lucius*), a voracious fresh-water fish of the family Esocidæ, occurring throughout the northern hemisphere. The body is narrow and elongated, reaching a length of from 45 to 46 inches, and a weight of from 35 to 36 lbs., or even more. The genus is represented in America by six smaller species commonly called pickerel, while *E. estor*, the great pike of the Great Lakes, is called 'muskellunge,' or 'maskinonge.' All possess game qualities and are excellent eating.

**Pike**, a military weapon, consisting generally of a long lancehead attached to a wooden pole or an iron spike. The pike has now been superseded by the more deadly bayonet.

**Pike, Albert** (1809-91), American poet. He practised law in Arkansas, and in the Mexican War he commanded a squadron in the Arkansas Calvary Regiment. At the opening of the Civil War he was Confederate commissioner to negotiate treaties with the Indians. From 1866 to 1868 he practised law in Memphis, Tenn., then removing to Washington, D. C., where he afterward resided, practising in the Supreme and district

courts. He rose to prominence in Freemasonry in the U. S., and published *Morals and Dogma of Freemasonry* (1870) and other Masonic works. 'To the Mocking-Bird,' 'The Widowed Heart,' and 'Dixie' are among his best known poems, some of which reach a high level. His writings were collected as *Prose Sketches and Poems* (1834), *Nugæ, verse* (1854), and *Poems* (1873 and 1881).

**Pike, Nicolas** (1818-1905), American naturalist. He removed early in life to Brooklyn, N. Y., and was the first to identify mastodon remains discovered in the neighboring town of Jamaica. Through the influence of Daniel Webster he was appointed U. S. consul in the island of Mauritius. He presented to Harvard more than 800 specimens and drawings of the fish of the Indian Ocean, and received the special thanks of Prof. Agassiz.

**Pike, Zebulon Montgomery** (1779-1813), American soldier, born at Lamberton, N. J. In 1805 he was ordered to ascertain the true source of the Mississippi, and in the course of the following winter worked his way with a small party as far north as Cass Lake. He also explored the Rocky Mountains, one of whose peaks bears his name.

**Pike's Peak**, a summit (14,107 ft. high) of the Rocky Mts., 12 m. w. of Colorado Springs, Col. It was named after Gen Zebulon M. Pike.

**Pilatus**, mountain mass, w. of the s. arm of Lake of Lucerne, Switzerland, reaches an altitude of 7,000 ft. A legend placed here the suicide of Pontius Pilate; but the name is in reality derived from *pileatus*, as the range is often 'capped' by clouds.

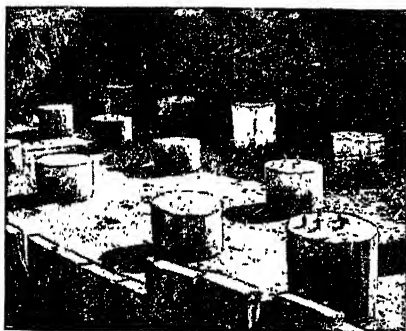
**Pilchard**, or **Sardine** (*Clupea pilchardus*), a European fish belonging to the same genus as the herring and the sprat. In commerce the pilchard and the sardine are regarded as distinct; but the sardine of the French fisheries is the pilchard in its first year. The habits are almost exactly the reverse of those of the herring. The fishery is conducted during the winter near the shore, the boats rarely going more than ten miles out. The young forms appear on the western coasts of France from May onwards, and have then a length of from five to seven inches. It is these young forms which constitute the sardines of commerce. The fish are captured both in drift-nets and in seines. The sardines are salted as soon as they are taken into port, and subsequently cooked in oil, and then

soldered into tin boxes which are filled with pure olive oil. Concarneau in Brittany is the chief center of this industry.

**Pile Dwellings.** The custom of living in houses built upon a platform supported by wooden piles is of great antiquity, and obviously had its origin in the desire for security against wild beasts.

**Piles, or Hæmorrhoids,** are chiefly due to the presence of some obstruction to the portal circulation.

**Piles and Pile Driving.** A load may be supported on soft or treacherous ground by driving down one or a number of long, heavy stakes or round timbers, called piles.



*Pile Foundation, before depositing concrete.*

This makes a pile foundation, a device of great antiquity (see PILE DWELLINGS). Piles are used in the same way to-day, in very great extent, affording the cheapest method of securing a foundation where the soil will not carry the load directly, or where it is not convenient to spread the foundation sufficiently. Timber piles are most used, but in recent times iron, concrete, and reinforced concrete have found application. In one method, the concrete is rammed into the hole by heavy drop hammers, tending to force the concrete out into the soil and thus form an enlarged bottom section. The Raymond pile is formed within a thin steel shell left in the hole after withdrawing the driving core. The Simplex method employs a strong tubular driving pile, through which the concrete is later rammed down, the steel pile being gradually pulled up. The steam-hammer pile-driver is much used. This has what is in effect a verticle steam-engine sliding in the leads and set on the pile head. Its heavy piston strikes the pile a rapid succession of short blows, which are more effective and less

destructive to the pile-head than the heavier impacts of an ordinary driver hammer. Jetting piles down is done by means of a water pipe fastened along the side of the pile or passing through the center (in concrete piles), a stream of water under heavy pressure being forced through the pipe so as to scour away the earth from in front of the pile point.

**Pilgrim,** one who makes a special journey (thence called a 'pilgrimage') for the purpose of visiting a shrine or other hallowed spot. Pilgrimages are common to most religions, and many places are credited with special sanctity. Thus, the mosque of the sacred city of Mecca attracts devout Moslems from all parts of Islam.

**Pilgrim Fathers.** In American history, the name applied primarily to the 41 male passengers (exclusive of servants) on the *Mayflower* who landed at Plymouth, Mass., in 1620, on Dec. 11. The title is sometimes inaccurately applied to all the early settlers of Massachusetts who held similar religious views.

**Pilgrim Fathers, United Order of the.** A fraternal organization established in 1879 for the purpose of furnishing insurance.

**Pillar,** the pier on which the arches rest in decorative architecture, although the Latin mediæval writers employed the word *columna*. Sir Christopher Wren constantly uses 'pillar' in describing both Roman and Gothic buildings.

**Pillau, or Pillay,** a Turkish dish of rice with fowl or mutton, raisins, almonds, chilies, and cardamons boiled or stewed together, and served up with sweet gravy and fried onions.

**Pilling, James Constantine** (1846-95), American ethnologist, born in Washington, D. C. In 1891 he took charge of the ethnological work at the Smithsonian Institution. He published, among other works, *Languages of the North American Indians* (1885); *Es-kimo Language* (1887); and *Mexican Language* (1895).

**Pillory.** This was a frame erected in a public place, with holes for the head and arms, in which malefactors were exposed to the public. The pillory was abolished by act of Congress in 1839.

**Pillow, Fort.** A fortification in Tennessee, 40 m. n. of Memphis at the junction of Cool creek and the Mississippi river. It was constructed by the Confederates under direction of Gen Gideon J. Pillow in 1861-62, but

after the defeat of the Confederate vessels on the river, was dismantled on May 25, 1862.

**Pills**, the most generally convenient and popular of all forms of medicine. They are formed from masses of a consistence sufficient to preserve the globular shape, and yet not so hard as to be of too difficult solution in the stomach and intestines.

**Pilot**, a person specially deputed to take charge of a ship while passing through a particular sea, reach, or dangerous channel, or from or into a port. Pilot boats usually lie well out to sea (5 to 200 m.) in the regions most traversed by ships. When the pilot is received on board a merchant ship he takes entire charge of her navigation, subject only to the right of the captain to supersede him if in his judgment this step becomes necessary.

**Pilot Fish** (*Naucrates ductor*), or **Romero**, a fish belonging to the family Carangidae. It is usually found in the open sea, and is widely distributed in tropical and temperate regions. It measures about a foot in length, is shaped like a mackerel and is variable in color.

**Pilot Snake**, the popular name of a harmless colubrine snake (*Coluber obsoletus*) of the Eastern United States. It is lustrous black with white-edged scales, and is sometimes six feet in length.

**Piloty, Karl von** (1826-86), German historical painter, was born in Munich. Among his best works are *Announcement of the Sentence of Death to Mary Stuart*, *The Discovery of America* and *Thusnelda in the Triumph of Germanicus*. A replica of the last is in the Metropolitan Museum of Art, New York City.

**Pilsen**, city, Czechoslovakia, now **Plzen**. Brewing is the leading industry, Pilsener beer having a world-wide reputation. The town was stormed by Count Mansfield in the Thirty Years' War (1618); it was Wallenstein's headquarters in 1633-4; p. 121,200.

**Pilsudski, Joseph** (1867-1935), Polish public official, spent five years in exile in Siberia for alleged conspiracy in an attempt on the life of Alexander III. After his return from exile (1892), he assisted in organizing the Polish Socialist Party and became editor of its secret paper, *Robotnik* (The Workman), whose aim was to prepare the people to work for independence. In the Great War the Polish Military Organization under Pilsudski's leadership helped to free

Poland from Russia and eventually from the Central Powers. In Warsaw (1918), he became Chief of State. This office he retained until the adoption of the constitution, when he declined the office of president. He accepted, however, the office of minister of war and chairman of the supreme army council.

Pilsudski virtually became dictator of Poland. For more than a decade he carefully balanced Poland's foreign policy to avoid embroilment with Soviet Russia, to the east, and Republican Germany, to the west, preserving the wartime friendship with France. But the rise of Adolf Hitler in Germany found Pilsudski leaning to a puzzling Germanophile attitude. He signed a ten-year peace agreement which helped the Nazis develop a stronger policy against France. He died in May, 1935.

**Piltdown Skull**, a palaeolithic human skull found in Piltdown Common, Sussex, England, in 1912. It is said to belong to the Pliocene period, and to be much older than the skulls of cavemen discovered in Germany, Belgium, and France.

**Pimento**, a genus of tropical American trees belonging to the order Myrtaceae. The chief species are *P. officinalis*, the pimento, or all-spice bush, furnishing in its dried unripe fruit the spice known by that name.

**Pimpernel**, a name given to certain plants belonging to the genus *Anagallis*, a subdivision of the order Primulaceae. The scarlet pimpernel (*A. arvensis*) is sometimes known as the poor man's weather-glass, because its flowers open only in fine weather.

**Pin**, an article of wood or metal, usually cylindrical in shape, used to fasten objects together. Safety-pins were an invention of the Bronze Age. By the 14th century pins had reached a place of importance in the commercial world. In 1483 the importation of pins into England was forbidden, and in 1543 an Act of Parliament regulated their sale and manufacture. 'Pinnes must be double-headed, the shank well smoothed, the point well sharpened,' and they could be sold only on the first and second day of January. From this custom the expression 'pin-money,' is said to have originated for then husbands supplied their wives with money expressly for their purchase. In 1817 Seth Hunt, an Englishman, patented an unsuccessful pin-making machine and seven years later, L. W. Wright, an American, patented the machine, which revolutionized the pin industry. Not until 1836, when the Howe Manufacturing

Co. opened a factory in Birmingham, Connecticut, was the industry practically established.

**Pina Cloth**, an expensive fabric made by the natives of the Philippine Islands from the fibres of the pine-apple leaf (*Ananas sativa*).

**Pinar del Rio**, city, Cuba, in the province of Pinar del Rio.

**Pinchot, Gifford** (1865- ), American forester and public official, was born in Simsbury, Conn. He was made president of the National Conservation Association in 1910, was commissioner of forestry for Pennsylvania, 1920-1923, and governor of Pennsylvania, 1923-1927. He was re-elected for 1931-35. He was one of the founders of the Yale School of Forestry, negotiated the settlement of anthracite coal strike (1923) and served on many commissions in connection with conservation, agriculture, and efficiency in government. When Pinchot resigned as national forester in the Taft Administration and led a fight against Secretary of the Interior Ballinger, the incident was a factor in the break between President Taft and Theodore Roosevelt which divided the Republican Party in 1912. (See FORESTRY.)

**Pinckney, Charles Cotesworth** (1746-1825), was colonel (1776) on Washington's staff, was a member of the convention which framed the Federal Constitution in 1787, of the S. C. Convention which ratified the Constitution and of the S. C. Constitutional Convention in 1790. In 1797 he was appointed with Marshall and Gerry to treat with France, but, as Talleyrand demanded \$240,000 as a condition of beginning negotiations, the American commissioners broke off relations and Marshall and Pinckney returned to America. When warned by Talleyrand that a refusal to negotiate might precipitate war, he is said to have made his famous remark: 'War be it then; millions for defence but not a cent for tribute.' When war seemed imminent with France he was appointed major general in the regular army. He was selected as the Federalist candidate for vice-president in 1800, and was the candidate for president against Jefferson in 1804, and against Madison in 1808.

**Pindar** (522 to 442 B.C.), Greek lyric poet, was a native of Thebes in Bœotia, and belonged to one of its noblest and most ancient families. He was influenced by the Theban poetess Corinna, with whom he is said to have competed several times and al-

ways unsuccessfully. His earliest extant poem was written in 502 B.C., and his latest in 452 or 450. Some authorities date his death earlier than 442, but its time and manner are uncertain. His extant poems represent only one side of his poetic activity. They are all *Epinician Odes*—odes written in honor of victors in the Greek national games. Pindar also composed hymns of praise to the gods; pæans or songs of prayer and thanksgiving, chiefly to Apollo; dance songs of a secular nature for festivals; processional hymns; hymns for choruses of girls; laudatory poems on heroes; drinking songs; dithyrambs or hymns to Dionysus; and, lastly, dirges. Odes of Pindar touch but lightly on the individual performer or his feat; they soon pass to speak of the glories of the family or the nation from which he is sprung, and, in retelling some well-known myth, illumine the present with the past.

**Pindus**, a mountain chain in central Greece, dividing Thessaly from Epirus; its greatest height is 7,665 ft.



Pine (*P. sylvestris*).

- 1, Stamen; 2, scale; 3, seed;  
4, cone.

**Pine** (*Pinus*), a genus of evergreen trees belonging to the family Coniferae. Many species and varieties occur which are distributed in vast forests all over the northern half of the globe, reaching even into the tropics, where they clothe the mountain

slopes. They are distinguished by their needle-like leaves in clusters of one to five. The fruit of the pine is a woody cone maturing in two or three years. Most of the species fall into two fairly well-marked groups—'hard' pines and 'soft' pines. The hard pines are heavier and darker-colored, ranging from yellow to deep orange or brown. The soft pines are lighter, and range in color from light red to white. When once well seasoned, pine wood is not subject to the attacks of boring insects. The straight-growing, tapering stem fits in for masts and spars. Perhaps the most valuable American species is the white pine (*P. strobus*), a tall stately tree from 100 to 120 ft. in height, found from Newfoundland to Manitoba and as far south as Northern Georgia. Another species of great economic importance is the long leaved *P. palustris*, also known as Georgia pine. Among the western pines is the valuable yellow or bull pine (*P. ponderosa*), a gigantic tree (300 ft.) with a narrow spire-like head, which forms in the Western United States the most extensive pine forests in the world. There are several pines which have edible seeds. In the West are the small, irregular piñon (*P. edulis*), the digger or bullpine (*P. sabiniana*), and others. These furnish a staple food supply for the Californian Indians.

**Pineapple** (*Ananas sativa*), a plant belonging to the natural order Bromeliaceæ, widely cultivated for its fruit. The plant grows to a height of from three to four



Pineapple.

feet, bearing long, rough edged, ridged and sharp-pointed leaves from the center of which springs up the flower stem—later turning to fruit. The pineapple grows in

warm climates, the West Indies, the Bahama Islands, Florida, the Azores, parts of North Africa and more especially the Hawaiian Islands, which have that porous, well drained soil, and alternate wet and dry climate in which it thrives best.

**Pine Bluff**, city, Arkansas, co. seat of Jefferson co., on the Arkansas River. Here are situated the State Branch Normal School, the Merrill Institute, St. Joseph's Academy, and a girls' industrial school. There is a large wholesale trade; the city was settled in 1832; p. 21,290.

**Pinero, Sir Arthur Wing** (1855-1934), English dramatist, was born in London. Commencing a legal career, he afterwards became connected with the stage, and acted at the Lyceum and Haymarket theaters, London. He became a master of the technique of playwrighting. Beginning with *The Money Spinner* (1880) he produced a series of remarkable farces and problem plays, as well as sentimental pieces. His plays, especially *Trelawney of the Wells* and *The Second Mrs. Tangueray*, attracted many famous actors and actresses. The latter was translated in several languages and acted in by Mrs. Patrick Campbell and Eleonora Duse. His later plays included *The Enchanted Cottage*, *The Gay Lord Quex*, *Mid-Channel*, and *A Cold June*.

**Pinerolo**, tn., prov. Turin, Italy. The prison is famous for having held the Man in the Iron Mask from 1679 to 1681, and also Fouquet; p. 18,039.

**Pines, Isle of**, an isl. 35 m. s. of Cuba, to which it belongs. Area, 1,214 sq. m. The scenery is picturesque, the climate mild and healthful, the soil light. The island was discovered by Columbus in 1494, and was long a resort for pirates; p. 3,199, chiefly concentrated in the town of Santa Fe and the capital, Nueva Gerona.

**Pine Snake, or Bull Snake**. A large, variegated, harmless serpent (*Pityophis melanoleucus*) common in the pine-covered country of the southern coast-region of the United States, noted for the loud blowing noise it makes when angered.

**Pine-tree Shilling**, money coined in Massachusetts from 1652 to 1682, deriving the name from the figure of a pine-tree stamped on one side. There were also 'pine-tree' threepence and sixpence pieces.

**Ping-pong, or Table Tennis**, a game that suddenly became popular in 1901, and has recently been revived. It is for two or four



players, and is practically lawn tennis on a table with specially prepared balls and rackets of a much smaller size.

**Pinguicula**, a genus of small marsh-plants belonging to the order Lentibulariaceæ. They usually bear a rosette of greasy-feeling radial leaves and violet, spurred flowers borne singly on erect flower-stalk. The leaves act like rennet, in curdling fresh milk.



*Pine-tree Shilling.*

**Ping-yang**, town in Chosen, 30 m. n.e. of its port, Chin-nam-po. Scene of battles between Japan and China in 1592 and 1894, China winning the former, Japan the latter; p. 71,702.

**Pink**, a name applied to the plant genus *Dianthus*, but more especially to the descendants of *D. plumarius* of Eastern Europe, and to the Oriental *D. chinensis*. Modern garden pinks are divided into two main classes—border pinks and show or laced pinks.



*Pink (Dianthus plumarius).*

**Pinkerton, Allan** (1819-84), American detective, was born in Glasgow, Scotland, and emigrated to Chicago in 1842. He became the first detective of Chicago, and in 1850 organized Pinkerton's National Detective Agency. The recovery of \$40,000 for the Adams Express Company in 1859-60 gave

Mr. Pinkerton his first reputation in the East, and, discovering a plot to murder Abraham Lincoln on his inaugural journey to Washington, he was authorized to make arrangements to insure the safe arrival of the President-elect in that city. Soon afterwards he was commissioned to organize the U. S. Bureau of Secret Service, which he conducted until the close of the Civil War. After the war he expanded his business, opening offices in New York and Philadelphia, the recovery of \$700,000 for the Adams Express Company and the arrest of some noted Bank of England forgers, adding greatly to the prestige of his agency.

**Pinkerton, William Allan** (1846-1923), American detective, born at Dundee, Ill. With his brother, Robert A. Pinkerton, he became chief assistant in the Pinkerton Agency, the business coming into their control on the death of their father in 1884, William taking charge of the western division, and Robert of the eastern.

**Pink Root**, a name given to the wormgrass or Indian pink of America (*Spigelia marilandica*). The root is sometimes used as an anthelmintic.

**Pinna**, a genus of bivalve molluscs, whose members are allied to the mussels. The shell is wedge-shaped, and consists of two equal valves.

**Pinnace**. A boat used in the British navy, which very nearly corresponds to the U. S. navy sailing launch. In build it resembles a cutter, but is larger and relatively broader of beam and shallower of draught.

**Pinochle** is played with two packs of cards, all below the nines being discarded, making a pack of 48 cards. It may be played by two, three, or four players, and the limit of points is 1,000. Ace is high and counts 11; ten is next, and counts 10; then come king, 4; queen, 3, and jack, 2. The nine counts 10 when it is turned up for trumps, and the last trick taken counts ten for the winner of it. The only technical term in the game is 'melding,' which means to declare. See Spalding's Home Library on *Pinochle*.

**Pinsk**, tn., Poland, to which it was restored in 1918 after being Russian 123 years; has potteries, tanneries, oil, soap and leather works; p. 23,291; seized by Russia, 1939.

**Pinsuti, Ciro** (1829-88), Italian musical composer. He wrote two successful operas, *Il Mercante di Venezia* (1873) and *Mattia Corvino* (1877); a *Te Deum* (1859); nearly three hundred songs, English and Italian, and

composed innumerable pianoforte pieces.

**Pint.** See **Weights and Measures**.

**Pintail** or **Sprigtail Duck**, or **Sea-pheasant** (*Dasila acuta*), a duck readily recognized by the elongation of the central tail feathers in the male. It is a frequent winter visitor to all parts of the United States, and breeds on inland waters from Maine and the Great Lakes northward.

**Pintle**, a vertical projecting pin like that often placed at the top of crane posts, and over which the holding rings at the tops of the wooden guys fit; also a pin such as is used for the hinges of rudders or of window shutters to turn round on.

**Pinto**, **Fernão Mendez** (c. 1510-83), Portuguese traveler, born at Montemor, near Coimbra; sailed for India (1537), and as captain-general of Malacca did marvellous deeds in the East Indies, China, Japan, and Siam. He returned to Portugal in 1558, and wrote his *Voyages and Adventures*.

**Pinturicchio**, **Bernardino** (1454-1513), the name commonly applied to Bernado di Betto, Italian artist, born at Perugia. His chief work is a series of frescoes representing the *History of Pope Pius II.*, for the library at Siena. He was also engaged to paint a *Nativity* for the monastery of St. Francis at Siena.

**Pinzon**, **Martin Alonso** (c. 1441-93), Spanish navigator and explorer, born at Palos, Spain. Pinzon and his brother took an active part in equipping Columbus's three caravels—the *Pinta*, the *Niña*, and the *Santa Maria*. On Columbus's first voyage Martin Pinzon commanded the *Pinta*.

**Pinzon**, **Vicente Yañez** (c. 1460-c. 1524), Spanish navigator and explorer, brother of Martin Pinzon, born at Palos. During Columbus's first voyage of discovery (1492-3) he commanded the *Niña*. About 1500 Pinzon, in association with Juan Diaz de Solis and accompanied by Amerigo Vesputius, made an important voyage, during which he visited the coast of Honduras and parts of the coasts of Mexico and Florida and circumnavigated Cuba. In another voyage he discovered the mouth of the Amazon river.

**Piombino**, formerly an independent principality, with an area of 138 sq. m.; now part of the Italian province of Pisa. Napoleon I. bestowed it on his sister Elisa, wife of Prince Bacciocchi, in 1805. She retained it for ten years, when it was joined to Tuscany.

**Pioneers**, the first explorers of a country. In a military movement, pioneers are those

who clear a passage through woods or other obstructions.

**Piotrkow**, or **Petrokov**. It is one of Poland's oldest towns, and numerous thriving industries are carried on; p. 41, 113.

**Piozzi**, **Hester Lynch** (1741-1821), Welsh author, better known as Mrs. Thrale, the friend of Dr. Johnson, who for eighteen years from 1764 visited at the Thrale's house at Streatham. On Thrale's death (1781) his widow married Piozzi (1784), who died in 1809. Her *Anecdotes* give a lively description of Dr. Johnson.

**Pipe**, an artificial channel for the conveyance of watery fluids, aeriform fluids, or sound. For the purpose of removing rain water from buildings, galvanized iron, tin, zinc, copper and lead pipes are used.

**Pipeclay**, a variety of fine white plastic clay, used in the manufacture of tobacco pipes and certain classes of pottery. It resembles kaolin, but contains a large percentage of silica. Pipeclay is found in the west of England.

**Pipefish**, a small marine fish belonging to the same family (Syngnathidae) as the sea-horse (See HIPPOCAMPUS), from which it differs in having a non-prehensile tail furnished with a caudal fin. The body is 6 to 10 inches long and slender. Like the sea-horses, it is a littoral form.

**Pipelines** are used to convey crude oil or natural gas from sources of supply to centers of distribution. The main fountain heads of the great oil-pipe network of the U. S. are in or near the oil-producing States of Tex., La., Okla. and Pa. In World War II a comprehensive pipeline program was undertaken. A new 24-in. pipeline from E. Texas to Norris City, Ill. was completed in 1943.

**Piperaceæ**, a natural order of herbs and shrubs of wide geographical distribution. They bear small flowers, usually without perianth, followed by small capsular or baccate fruit. Pepper and betel are among the products of members of this order.

**Piperidine**,  $C_4H_{11}N$ , a secondary amine occurring in combination with piperic acid in pepper.

**Pipes**, **Tobacco**. The earliest pipes, made of clay and known as 'elfins,' were very similar to those of the present time only much smaller. Modern clay pipes are formed of pipeclay. The 'briar-root' is a popular form. The earliest forms of pipes were those of the North American Indians. The best known was the calumet, or pipe of peace,

which was passed round among the warriors in order of rank and age.

**Pipestone**, city, Minn. Extensive deposits of building stone and Indian pipestone are quarried, and the city has a considerable trade in grain; p. 4,682.

**Pipettes**, tubes open at both ends, used for accurately measuring off small quantities of liquids.

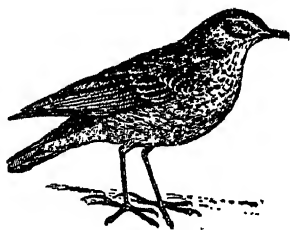


Pipette.

**Piping Crow**, a genus of passerine birds, related to the shrikes. They are large birds with glossy black and white plumage and have a clear, ringing cry. There are four species, confined to Australia and Tasmania.

**Pipi Pods**, the fruits of the tropical leguminous tree *Casalpina pipai*. The pods possess astringent properties.

**Pipit**, a large genus of passerine birds, most nearly related to the wagtails, but presenting some superficial resemblance to the larks, with which they are sometimes confused. The best known American species is the Titlark.



Meadow Pipit.

**Piquet**, one of the oldest of card games, said to have been invented in the reign of Charles VII.

**Piracy**. Among the acts defined as piracy are 'the crime of piracy as defined by the law of nations, robbery committed in any vessel upon the high seas; robbery on shore by the crew of a piratical vessel; murder or robbery committed upon the high seas or in

any river, harbor, basin or bay out of the jurisdiction of any particular state; murder, robbery, or any act of hostility against the United States committed on the high seas by a citizen under a commission of a foreign state or by the citizen of a foreign state which is at peace with the United States; and the taking of a negro from any foreign shore for the purpose of slavery, or the forcible detention of a negro on board a vessel for a similar purpose.' The penalty originally prescribed for piracy by act of Congress was death, but this was in 1897 changed to imprisonment for life. The English law of piracy is substantially like that of the United States.

**Piræus**, (Gr. *Peiraiæus*), town, Greece, in ancient Attica,  $4\frac{1}{2}$  m. s. of Athens, whose seaport it was after about 485 B.C. Since 1835 it has again become a flourishing port. It has an arsenal, exports olives and olive oil, and has cotton mills, machinery factories, and other manufactures. It is the chief port of entry in Greece for imports. The most important item exported from Piræus is marble from the quarries of Pentellicus; p. 251,328.

**Pirandello, Luigi** (1867-1936), Italian author and dramatist was born in Girgenti. He wrote his first play after his fiftieth year. In 1934 he received the Nobel prize in literature. His work is marked by a constant seeking for reality, and the problem of personality seems to be almost an obsession with him. Among his plays are *Six Characters in Search of an Author*, *Florian's Wife*, *As You Desire Me*. In 1932, *As You Desire Me* was filmed with Greta Garbo in the leading role.

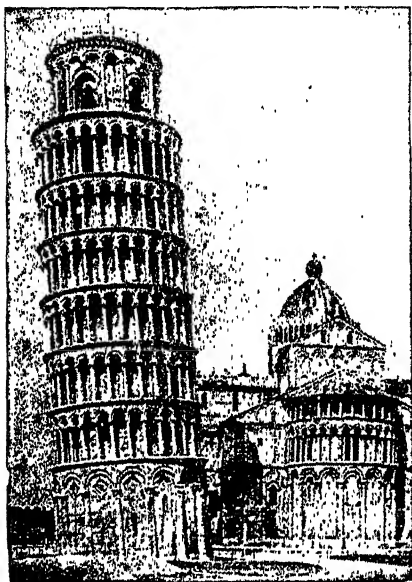
**Pirano**, town, Italy. The churches of San Francisco and San Michele contain valuable works of art. It has important salt works and wine and olives are exported. Until after the Great War it belonged to Austria; p. 16,000.

**Pirot**, town, Yugoslavia. It is a fortified place of strategic importance, and is noted for the manufacture of carpets. During the Great War it was taken by the Bulgarians; p. 10,462.

**Pisa**, city, Italy, capital of the province of Pisa. Its chief glory is the Piazza del Duomo with the cathedral, baptistery leaning tower and Campo Santo. The cathedral, a magnificent Gothic structure, commenced in 1063, was completed in 1118; the Campo Santo, or cemetery begun in the 13th cen-

tury is said to have been formed of earth brought from Calvary. The famous leaning tower, a campanile built entirely of marble, 178½ ft. high, was commenced in 1174 and completed in 1350. It leans 13 ft. out of perpendicular. From its top is a magnificent view of the surrounding country; p. 77,000.

**Pisano, Andrea** (c. 1270-1349), Italian



*Pisa: Leaning Tower.*

sculptor and architect. He went to Florence and the first bronze door of the Florentine Baptistery has been ascribed to him.

**Pisano, Giovanni** (1240-1328), Italian architect and sculptor. He built the cloister which surrounds the Campo Santo of Pisa.

**Pisano, Niccolò** (1206-78), Italian sculptor and architect. His most important works are the pulpits for the Baptistery in Pisa and the Cathedral in Siena.

**Pisces**, the 12th zodiacal constellation.

**Pisciculture**, a term usually restricted to the artificial breeding, rearing and transporting of fish and other marine creatures. A primitive form of pisciculture, which consisted in keeping fishes in ponds or enclosures, and feeding and protecting them until they reached a size suitable for the table, was practised among the ancient Egyptians, Greeks, and Romans. Modern pisciculture deals with the artificial impregnation of the eggs and the rearing of the fry from the earliest stages.

**Piscina**, (Lat. 'a cistern,' or 'pond'), a small font or basin, usually supplied with running water, in a niche at the south side of a church altar, into which the priest pours the water used in his priestly duties.

**Pishin**, formerly a district of South Afghanistan, north of Quetta. Since 1878 it has been occupied by the British, for strategic purposes; p. 65,000.

**Pisistratus**, (c. 600-527 B.C.), Athenian statesman, of noble family. He came forward as a political leader, and having seized the Acropolis, he made himself tyrant in 560 B.C. He was a patron of art; he built a temple to Athena on the Acropolis; and he began the vast temple to Olympian Zeus near the Ilissus, only finished by the Roman emperor Hadrian, nearly seven hundred years after its foundation.

**Piso**, a family of the Calpurnian clan at ancient Rome.—**LUCIUS CALPURNIUS PISO** was consul in 58 B.C. His daughter Calpurnia married Julius Cæsar. In 50 B.C. Piso was censor.

**Pisolite** (Greek 'pea stone'), a concretionary limestone, differing from oolite in having the particles as large as peas.

**Pistacia**, a genus of trees of the natural order Anacardiaceæ, having dioecious flowers without petals, and a dry drupe with a bony stone. In the south of Europe and in the east *Pistachio nuts* are much esteemed; and oil is expressed from them for culinary and other uses. They are easily procurable in the United States. The Turpentine Tree (*P. terebinthus*) yields the turpentine known in commerce as *Cyprus Turpentine*, *China Turpentine*, or *Scio Turpentine*.

**Pistil**, that part of the flower which, after flowering is over, is developed into the fruit.

**Pistoja** (ancient *Pistoria*), town, province Florence, Italy. The Cathedral of San Jacopo (twelfth century) is rich in works of art. Among other famous churches and secular buildings are the Madonna dell' Umiltà, San Giovanni, San Domenico, the Palazzo Pretorio (1367), the Palazzo del Comune (1294), and the Ospedale del Ceppo (1277). The principal manufactures are iron and steel wares, agricultural implements, paper, oil, and silk. The town has the credit of having invented and first made pistols; p. 76,000.

**Pistol**. See **Revolvers**.

**Pistole**, a gold coin formerly current in Spain and Italy.

**Piston**, a circular body, driven by, or act-

ing against, a fluid pressure. It is usually guided in its stroke by the walls of the cylinder—of the chamber in which it works—and also by the gland in the cylinder cover through which the piston rod slides. Pistons are generally made of cast iron, but in engines for air craft, aluminum pistons are much used.

**Pita Hemp**, one of the names of the Agave fibre.

**Pitaka**, a division of the Buddhists' sacred literature; the *tripitaka* meaning the three great divisions of their canonical works, the *Vinaya* (discipline), *Abhidharma* (metaphysics), and *Sūtra* (aphorisms in prose), and collectively, the whole Buddhistic code.

**Pit and Gallows**, a rendering of the grant of capital jurisdiction (*cum fossa et furca*) made by vassals to the British crown in feudal times.

**Pitcairn, Harold F.** (1897- ), aviation expert. He began building airplanes in 1925. He is pres. of Pitcairn Aircraft, Inc., and of the Autogiro Co., of America. In 1930 he was awarded the Collier trophy for the "greatest achievement in aeronautics," — the development of the autogiro.

**Autogiro**, a type of aircraft employing horizontal rotatory airfoils, invented by Juan de la Cieroa, Spanish aviator, and developed by Harold F. Pitcairn. The propeller, an ordinary form driven by a normal type of engine, is mounted vertically above the fuselage which is of standard airplane type, as are also the landing gear and tail unit. Controls are practically the same as on an airplane, except the ailerons which are carried on the sides of the fuselage. The great advantage of the autogiro is that it can make practically vertical landings. It is expected to become a safe and popular means of flying with commercial production as planned.

In 1936 Pitcairn developed an autogiro which is easily made serviceable as an automobile. The propeller wings fold back and the motive power is geared to the landing wheels, thus producing a roadable vehicle. As an automobile the autogiro reaches a speed of thirty-five miles per hour.

**Pitcairn, John** (c. 1740-75), British soldier. He was in command of the advance guard of British which entered Lexington on April 19, 1775, and found the minute men drawn up on the common. After ordering them to disperse he gave the order to fire, and is said to have fired the first shot himself. He was mortally wounded at the Battle of Lunker Hill (June 17, 1775).

**Pitcairn, Robert** (1836-1909), American railway manager, was born near Paisley, Scotland. In 1867 he helped organize the Westinghouse Air Brake Company, and was for many years its vice-president.

**Pitcairn Island**, a solitary island in the Pacific Ocean, between Australia and South America. Area, 1 by 2½ m. It was discovered by Carteret in 1767. In 1790 it was taken possession of by nine of the mutineers of H.M.S. *Bounty* with six Tahitian men and a dozen women. Of nine British sailors, only one, Adams, was left in 1800, and from him the present inhabitants (150) are descended. The island was annexed to Britain in 1839. Nearly 200 of the islanders were transferred to Norfolk Island in 1856, but a number of them afterward returned.

In 1932 Norman Hall and Charles Nordhoff collaborated on a book *Mutiny on the Bounty*, which was based on the story of the mutineers. The book had a tremendous sale, remaining on the list of best sellers for many months, and was later screened.

**Pitch**, the angle of slope of a roof; the distance from center to center of the teeth of



Sir Isaac Pitman.

a toothed wheel, or between like poles of a dynamo, or between threads of a screw; the distance apart of rivets.

**Pitch**, in music, the degree of acuteness of musical sounds, determined by the series of periodic vibrations which produce the sound; the more rapid the vibrations the higher the sound, and *vice versa*. The pitch of musical

instruments is adjusted by means of a tuning fork, consisting of two prongs springing out of a handle, so adjusted as to length that when struck a particular note is produced.

**Pitch**, the complex mixture of hydrocarbons and their derivatives that is either left when tar, oils, or fatty acids are distilled, or is found naturally in Trinidad and other places. Coal-tar pitch, which is typical of the others, forms about two-thirds of the tar. Wood-tar pitch is much used in America for protecting timber from the weather and the attacks of insects.

**Pitchblende**, or **Uraninite**, an impure uranous uranate,  $U(VO_4)_2$ , found in the Erzgebirge, Cornwall, Hungary, and Colorado. It is the only practically available raw material from which uranium can be extracted, and this constitutes its chief value. The radio-activity of pitchblende led to the discovery that it contained radium, polonium, and actinium.

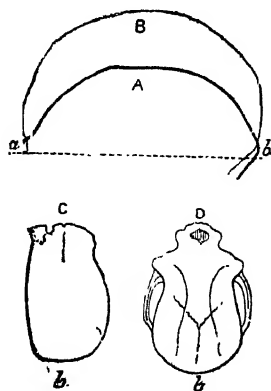
**Pitcher**, **Molly** (c. 1756-1823), née Mary Ludwig, was born in Carlisle, Pa. While besieged in Fort Clinton along with her husband, she is said to have discharged the last gun against the British. She also distinguished herself at the Battle of Monmouth (June, 1778). After the battle, covered with blood, she was presented by General Green to Washington, who made her a sergeant for her bravery, and placed her on the list of half-pay officers for life.

**Pitchstone**, a glassy igneous rock, dark green, brown, gray, or almost black in color. It contains about 5 per cent. of water, and is characterized by a somewhat greasy or resinous lustre.

**Pith**, or **Medulla**, the central cellular part of the stem of a flowering plant. In the growing condition it is juicy and greenish, but afterward the protoplasm inside the cells dies, and the cell sap becomes replaced by air. The pith then appears pale, dry, and spongy, as is emphatically shown by the elder.

**Pithecanthropus Erectus**. In 1892 Dr. Dubois discovered, in some fluviatile beds in the island of Java, the roof of a skull and a thigh bone. It is probable that the two bones belong to the same skeleton, and indicate an animal which must have belonged to a very primitive group of the human race. They resemble the Neanderthal, Engis, and Spy skulls. Some doubt remains as to the age of the beds in which they were entombed,

for many authorities would assign them to the Pleistocene period.



*Pithecanthropus Erectus*.

Profile outline of skull of *Pithecanthropus*, A, compared with outline of skull of European man, B; C, upper surface (norma verticalis) of skull of *Pithecanthropus* compared with skull of (D) gibbon (*Hylobates syndactylus*): a, ophryon; b, occipital point.

**Pithom**, one of the store cities which the Israelites built for Pharaoh in Egypt.

**Pitkin**, **Timothy** (1766-1847), American lawyer and historian, was born in Farmington, Conn. Among his publications are *A Statistical Views of the Commerce of the United States* (1816); *History of the United States from 1763 to the Close of Washington's Administration* (2 vols., 1828), long a standard work.

**Pitman**, **Benn** (1822-1910), Anglo-American stenographer and art teacher, brother of Sir Isaac Pitman, was born in Trowbridge, Wiltshire, England. He studied in the academy of his brother, whom he subsequently assisted in completing his system of phonography. He settled in Cincinnati, and there established the Phonographic Institute, of which he was president until his death. In 1856 he invented the process for reproducing relief copper plates of engraved work by galvanic action. He wrote *A Plea for American Decorative Art* (1895); *Life of Sir Isaac Pitman* (1902).

**Pitman**, **Sir Isaac** (1813-97), inventor of a system of shorthand, was born in Trowbridge, Wiltshire. His method of shorthand

became very popular, and is extensively used. He began the *Phonetic Journal* in 1842.

**Pitrè, Giuseppe** (1843-1916), Italian folklorist, was born in Palermo. His huge *Biblioteca delle Tradizioni popolari Siciliane* (18 vols., 1870-88) is his great work. He has also compiled a valuable bibliography of Italian folklore (1894), and was the principal editor of the *Archivio per lo Studio delle Tradizioni popolari* (1882 et seq.).

**Pit River Indians**, sometimes spoken of as the Palaihnihan linguistic stock, residing along Pit River, one of the branches forming the Sacramento in California. They are said to have taken their name from the practice of digging pits in the paths along the river for catching deer.

**Pitt, William** (the Elder). See **Chatham, Earl of**.

**Pitt, William** (1759-1806), British statesman, was the second son of Lord Chatham, and was born in Hayes, Kent. He opposed Lord North's government, especially denouncing the war with the American Colonies. In December, 1783, the coalition government of North and Fox ceased to exist, and Pitt was asked to form a government. He accepted the First Lordship of the Treasury and the Chancellorship of the Exchequer. Pitt had to govern the country in the face of a great Parliamentary majority; but his debating power and his desire to secure financial purity gradually won the country over to him. On March 25, 1784, an appeal was made to the country, and Pitt came back to power, and, with a brief interval, ruled the nation for twenty years. When he got fairly established, Pitt set himself to purify the government, and especially to introduced economic reform. He was not long in power before he reformed the East India Company on a new basis, which existed till the Act of 1858. Pitt's war policy, in the opposition of England to the French Revolution and Napoleon, naturally divided itself into two parts—to break the power of France on land, and to maintain England's supremacy at sea. In the latter he was successful. Two days after the news of the surrender at Ulm reached England came the intelligence of Nelson's splendid victory at Trafalgar on Oct. 21. Following upon the surrender of the Austrian army came the terrible news that the Emperor of the French had destroyed the combined armies of Russia and Austria at Austerlitz. In less than a month afterward Pitt died. A national funeral was accorded

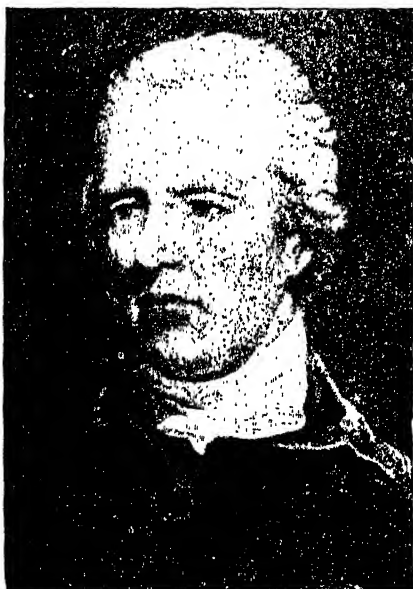
him, and his body was buried in Westminster Abbey, beside that of his father. His work did much to bring about the ultimate defeat of Napoleon, and in many respects Pitt may be considered England's greatest Prime Minister. His title to enduring fame rests upon the work he did in the sphere of economics. In matters purely political he was essentially Liberal. When regard is had to the difficulties with which he was surrounded, not the least of these being the obstinacy of George III., Pitt deserves high praise, not only for his enlightened views, but for the skill which he displayed in situations of the most forbidding nature.

**Pitta**, an Old World passerine bird, found chiefly in Southeastern Asia, the type genus of the family *Pittidæ*. It has a thickset form, long legs, short wings and tail, and varies considerably in size. It is noted for its brilliant and varied coloring.

**Pittacus**, a native of the ancient Greek city of Mitylene. He was reckoned among the Seven Wise Men of ancient Greece.

**Pittsburgh**, city and port of entry, Pennsylvania, county seat of Allegheny co., is situated at the junction of the Monongahela and Allegheny Rivers, which here form the Ohio River. The city contains 41 sq. m., and has over 40 m. of water front. The Monongahela is navigable 100 m. s. to the coal fields of West Virginia, and the Allegheny an equal distance n. into the Pennsylvania coal and oil fields; while the Ohio affords connection with the Mississippi and the Gulf of Mexico. Pittsburgh is a growing center of intellectual life. Among its educational institutions are the University of Pittsburgh, Carnegie Institute, Pennsylvania College for Women, Duquesne University. The city was originally settled by the Scotch-Irish, and the chief religious denomination is the Presbyterian. It is the seat of a Roman Catholic and a Protestant Episcopal bishop. There are about 515 churches, notable edifices being the Roman Catholic Cathedral; Cathedral of St. Paul and Trinity and Calvary Churches (Episcopal). The geographical advantages possessed by Pittsburgh as a distributing center, and its location in the heart of the greatest coal fields of the continent, with vast deposits of iron ore close at hand, made it long ago the second city of Pennsylvania in manufactures, commerce, wealth, and population. Later, the rich stores of petroleum and natural gas in the region were added to its other advantages. It early became, as Bancroft called

it, 'The Gateway of the West.' Other titles, such as 'The Smoky City,' 'The Workshop of the World,' 'The Hearth of the World,' were given to it on account of its extraordinary development of the iron, steel, coal and coke industries. In the production of these, Pittsburgh ranks first in the world. It is the greatest distributing point for coal in the United States. The manufacture of steel is the chief industry of the Pittsburgh district, among its leading concerns being the Carnegie Steel Company and the Westinghouse works.



*William Pitt.*

Pittsburgh, besides being the headquarters of the United States Steel corporation, is the largest producer of steel rails and armor plate in the United States. The Heinz works, the largest pickling and preserving establishment in the world, are located here, with 12 factories, using the products of 20,000 acres of vegetable farms. The Westinghouse air-brake works employ 3,000 operatives. The natural-gas interests are enormous. Since 1911 the city is governed by a mayor, controller, and a board of nine councilmen elected at large, to replace the old bi-cameral council of 67 members. In 1911 the 66 independent district school boards were also abolished, giving place on Jan. 1, 1912, to a central board of 15 members. The population of Pittsburgh is 671,659. In 1753 Governor Dinwiddie of Virginia sent George Washing-

ton to warn the French—who had advanced into the region about the source of the Ohio, which they claimed—that the Colony would resist their encroachments. The next year he despatched militia to build a fort on the present site of Pittsburgh; but a large force of French and Indians compelled them to withdraw. In the same year the French built Fort Duquesne, and Washington captured a body of French troops in the first actual fight of the French and Indian War. In 1758 General Forbes led a powerful expedition against the fort, which was burned by the French. At Washington's suggestion the place was named Pittsburgh, in honor of the British Prime Minister. A new fort was built, called Fort Pitt, which in Pontiac's War (1763) was besieged by the Indians, holding out until relieved by a British force. A town was laid out in 1784; in 1791 it became a county town; a borough in 1804; and a city in 1816. In 1906 the citizens of Pittsburgh and Allegheny voted on the question of uniting the two cities. A majority of the citizens of Pittsburgh favored consolidation, but a majority of the citizens of Allegheny voted against it, and subsequently appealed to the courts. In 1907 the U. S. Supreme Court held that the Consolidation Act was valid, and annexation became effective on Dec. 9 of that year. Allegheny is now the North Side of the present Pittsburgh. For years the problem of smoke prevention has engaged the attention of municipal officials, and their efforts have resulted in a great improvement in the situation. In 1911 a thorough investigation of the smoke problem, authorized by the city, was undertaken by the Department of Industrial Research of the University of Pittsburgh. As a result, the smoke nuisance was abated fully 75 per cent. In 1940 further steps in smoke prevention were taken. In World War II Pittsburgh's industry was almost wholly absorbed in production of goods for national defense.

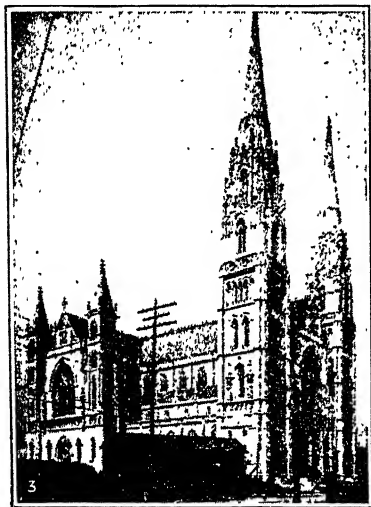
**Pittsburgh, University of**, a non-sectarian institution of higher learning for both sexes, chartered Feb. 28, 1787, as the Pittsburgh Academy, reorganized as the Western University of Pennsylvania in 1819, and renamed the University of Pittsburgh in 1908. It comprises a College of Liberal Arts, Graduate School, and Schools of Engineering, Mines, Education, Economics, Medicine, Dentistry, Law, and Pharmacy, and the Mellon Institute of Industrial Research, as well as an evening and a summer school.



**Pittsfield**, city, Massachusetts, county seat of Berkshire co. It is situated near the western boundary of the State, surrounded by the picturesque Berkshire Hills, and is a favorite summer resort and automobile center. The more important institutions include the House of Mercy, the Berkshire Athenæum, with a library of 70,000 volumes, a museum of natural history and art, the Roman Catholic Cathedral, the Henry W. Bishop Training School for Nurses, and the Berkshire County Home for Aged Women. The Court House is a fine white marble structure. The city possesses a soldiers' monument, *The Color*

of the gland is associated with gigantism and acromegaly; underfunction of the anterior lobe with skeletal underdevelopment and diminution or cessation of sexual activity; underfunction of the posterior lobe with adiposity, drowsiness, and evidences of lowered metabolic activity.

**Pit Villages**, or aggregations of pit dwellings, are sometimes understood to be subterranean colonies. Vestiges of such dwellings are found in the island of Yezo, Japan, where their occupants are said to have been an extinct race called Koro-pokguru. Similar depressions in many parts of the British Isles



*Pittsburgh.*

Left, St. Paul's Cathedral; Right, The Bank of Pittsburgh.

*Bearer*. Pittsfield has important industries, including the manufacture of electrical goods, automobile sundries, textiles, paper-mill machinery, and paper. The first settlement here was made in 1743, and was known as Boston Plantation. It was incorporated as the town of Pittsfield in 1761, the name being given in honor of the elder Pitt; p. 49,684.

**Pituitary Body**, or hypophysis cerebri, is a small roughly spherical mass, weighing about 0.5 gm., lying at the base of the brain in a depression of the skull called the sella turcica. Recent studies show that the gland has a profound effect on the animal economy: the removal either of the entire gland or of the anterior lobe in experimental animals is followed by sudden death; while partial removal of the anterior lobe causes in young animals retardation of skeletal growth and arrest of sexual development, and in fully grown animals abeyance of sexual function and genital atrophy. In man hypertrophy

are assigned to primitive British tribes.

**Pityriasis**, a term applied to a group of skin diseases in which the epidermis is cast off in bran-like scales. *Pityriasis versicolor* is characterized by the formation of brownish, scaly patches of irregular shape and size. *Pityriasis rubra*, or *Hebra's pityriasis* is an inflammatory condition of the entire skin which becomes deep red in color and covered with white scales. It may become chronic, and is frequently fatal.

**Pius**, the name of 10 popes of the Roman Catholic Church.

**PIUS I.** (140-155). Practically nothing certain is known of this pope.

**PIUS II.** (1458-64), Æneas Sylvius Piccolomini, who was born in Siena in 1405, was a man of literary and oratorical powers, and at the Councils of Basel reconciled the interests of the Emperor Frederick III. and the papacy.

**PIUS III.** (Sept. 22, 1503-Oct. 18, 1503),

Francesco Tedeschi Piccolomini, nephew of Pius II.

PIUS IV. (1559-65), Giovanni Angelo de' Medici, was born in Milan in 1499. He was pope during the final sittings of the Council of Trent (1562-4), and during the last sessions of the council won over the Emperor Ferdinand I. and the Cardinal of Lorraine to his views. Pius IV. has given his name to the famous 'Profession of Faith,' which is imposed on all taking ecclesiastical office, and is used in the reception of converts into the Roman Catholic Church. He founded the pontifical printing office.

PIUS V. (1566-72), Michele Ghislieri, was born in Bosco, Lombardy, in 1504. On his accession he severely enforced the Tridentine decrees, and during his papacy the counter-reformation made prodigious efforts. He issued the famous bull of excommunication against Elizabeth of England (1570), and warmly espoused the cause of Mary, Queen of Scots, thereby deepening the chasm between England and Roman Catholicism. But it is chiefly in connection with his inflexible opposition to the Turkish power that his name is remembered. In 1712 he was canonized, being the last pope to receive that distinction.

PIUS VI. (1775-99), Giovanni Angelo Braschi, was born in Cesena in 1717, and was promoted by Benedict XIV. He was elected pope in succession to Clement XIV. He opposed the ecclesiastical policy of Emperor Joseph II., excommunicated Talleyrand, and was involved in France through his refusal to accept the civil constitution of the clergy. He created the see of Baltimore, the first Roman Catholic diocese in the United States.

PIUS VII. (1800-23), Barnabas Luigi, Count Chiaramonti, was born in Cesena in 1742. He was allowed to enter Rome in 1801, the French troops being withdrawn. In that year he made the Concordat with Napoleon, who was anxious to restore religion in France; and in 1804 he consecrated Napoleon as emperor. In 1809, however, Rome itself and all the territory which had not already been taken were annexed to the French empire. The issue of a bull of excommunication was followed by the removal of the pope to Grenoble, and thence to Savona and Fontainebleau. The Congress of Vienna formally restored to him his territory.

PIUS VIII. (1829-30), Francesco Xaverio, Count Castiglione.

PIUS IX. (1846-78), Giovanni Maria, Count

Mastai Ferretti, was born in Sinigaglia in 1792. In 1854 Pius promulgated the doctrine of the Immaculate Conception, and in 1870 that of Papal Infallibility. He also re-established the Roman Catholic hierarchy in England (1850). In 1864 he issued a *Syllabus Errorum*.

PIUS X. (1903-14) (Giuseppe Sarto), was born of humble parents at Riese, near Venice, in 1835. In August, 1903, he was elected pope, after six fruitless ballots. The principal events of his reign were the separation of church and state in France and Portugal. The *Syllabus* issued by him in 1907 contained a list of 65 condemned propositions, dealing chiefly with extreme and radical positions taken by certain modern writers on matters pertaining to Christian belief, Biblical criticism, theology, church discipline, etc. By his *Ne Temere* decree of 1907, aimed at clandestine and irregular marriages, the Catholic Church recognizes as valid only those marriages contracted before the parish priest or ordinary, and at least two witnesses. Among important measures inaugurated by him were the codification of the canon law and the simplification of church music.

PIUS XI. (1922-1939) (Achille Ratti), was born in Descio, in 1858. After studying in the diocesan seminaries, he went to Lombard College in Rome, obtaining doctor's degrees. He was ordained a priest in 1878, and from 1882 to 1888 was professor of dogmatic theology and sacred eloquence in the seminary of his diocese. He was called to the Vatican to be assistant prefect of the library in 1911, and two years later became prefect. In 1918 he was appointed Papal Nuncio to Warsaw, in 1919 was made Archbishop of Lepanto, and in 1921 Archbishop of Milan. He was created cardinal, 1921, and succeeded Pope Benedict XV. as Pius XI., Feb. 6, 1922. His greatest accomplishment as pope was the Lateran Treaty with Italy, 1929, which restored the sovereign temporal power of the papacy.

PIUS XII. (1939-) (Eugenio Pacelli), was born in Rome in 1876. He is a distinguished scholar, speaking nine languages. Rising rapidly as a priest, he was Nuncio at Munich during the World War. Continuing in the diplomatic service of the Church, he was made cardinal in 1929, became Vatican Secretary of State two months later and capably served as such until his election to the papacy on his 63rd birthday, March 6, 1939. He has travelled more widely than

any other pope, having visited the U. S. and South America. His association was long and intimate with his predecessor, Pius xi.

**Pizarro, Francisco** (1478-1541), Spanish conqueror of Peru, was born in Trujillo, Estremadura. He first saw military service in Italy under Gonsalvo de Cordova. He then sailed to America, and was with Balboa when he discovered the Pacific. Pizarro and Almagro set off for the conquest of Peru in 1532. Atahualpa, the Inca king, instead of attacking the Spaniards, sent an embassy with gold and other gifts to appease them; and Pizarro in return sent his brother and Hernando de Soto to the Inca with a message from the Pope and information about the Emperor Charles v. The two Spaniards persuaded Atahualpa to visit Pizarro. At the meeting Pizarro attacked the Indians, took the Inca prisoner, and sacked his camp. After killing the Inca, Pizarro and Almagro took and sacked Cuzco in 1533. The young Inca, Manco, was given the nominal authority, which Pizarro in reality kept in his own hands. Civil war then broke out between the Pizarrists and Almagrists, during which Almagro was defeated and executed in 1538. Three years later Pizarro was assassinated at Lima by the Almagrists. Consult Prescott's *History of the Conquest of Peru*.

**Placenta, or Afterbirth**, the organ by which the foetal mammal is intimately connected with the mother until the moment of birth. Physiologically the placenta may be described as a highly vascular sponge, in which the foetal blood takes up oxygen and food material from the maternal blood, so that by the placenta the foetus both feeds and breathes. When only the foetal portion of the placenta is shed at birth, the placenta is described as *indeciduate*. When the maternal part of the placenta is shed in addition to the foetal, leaving an open wound on the wall of the uterus, the placenta is *deciduate*.

**Placid, Lake**, a resort and lake, 1,800 ft. above sea level, in the n.w. corner of Essex co., New York, in the Adirondack Mountains. Nearby are the farm and burial place of John Brown.

**Plagiarism** is the wilful appropriation of something originated by another in literature or art, especially literature, and passing it off as one's own. Plagiarism was the Latin word for kidnaper, but it came into popular use among the Romans to signify a literary thief.

**Plagioclase**, a triclinic feldspar constituting an important ingredient of igneous, metamorphic, and sometimes sedimentary rocks.

**Plague, Bubonic**, a specific communicable disease, affecting various rodents and man, appearing usually in epidemic form, of extraordinary virulence and very rapid course, with a tendency to linger and recur when once it has attacked a community. It is characterized by fever, severe headache, extreme depression, and incoördination of the muscles. The disease, in a large proportion of cases, ends fatally in three to five days. The first great pandemic took its origin at Pelusium in 542, and spread over Europe. After this wave of infection had spent its force, Europe was comparatively free from the disease until the 11th century, when the returning Crusaders brought it back with them from Asia. Severe epidemics occurred in rapid succession, and finally culminated in the greatest pandemic of any disease in history—the Black Death of the 14th century. It is generally believed that from one-third to one-half of a population of 5,000,000 died during its year of visitation. One-fourth of the whole population of Europe is thought to have perished of the disease. After the 17th century, however, Western Europe was practically free from this plague. During the 19th century the plague in Europe was confined almost exclusively to Turkey and Southern Russia.

An outbreak of the pneumonic form of plague which broke out among marmot hunters in Manchuria in October, 1910, spread rapidly along the railway lines, and caused 46,000 deaths.

The cause of the plague is the *Bacillus pestis*, discovered by Kitasato at Hongkong in 1894, and independently by Yersin in the same year. This bacillus is short, thick, rounded at the ends; it is a cocco-bacillus, which has been found in nearly every organ and secretion of the body.

The first important point in the etiology of bubonic plague is the connection between human epidemics and epizootics among rodents. When the pandemic began in 1894, the relationship between dead rats and cases of plague was shown to be very close—the maximum point for the rodent disease preceding that for human plague by a few weeks. The definite proof that the rats did suffer from infection with the plague bacillus was furnished in 1902 by extensive bacteriological investigations in Hong-kong. As Dr.

Rucker, of the U. S. Public Health Service, puts it, 'Plague is primarily a disease of rodents, and secondarily and accidentally a disease of man.' It was P. L. Simond who first suggested, in 1899, that the flea furnished the medium by which bubonic plague is transmitted from rat to rat and from rat to man. Several different vaccines are in use which exert an important effect in the reduction of the mortality from plague, and which furnish a valuable adjunct to sanitary preventive measures.

**Plaice**, (*Pleuronectes platessa*), a valuable European flat-fish, distinguished by the eyes being on the right side, red spots on the upper surface, and bony tubercles behind the eyes. It may exceed thirty inches in length, though usually it measures less than 2 ft., and weighs from 8 to 10 pounds. The plaice is found from the Bay of Biscay to the n. coast of Europe, and is abundant in moderately deep and shallow water at Iceland and around the British Isles.

**Plain**, a land surface which approximates to a plane. As a rule, the term is confined to such flat surfaces as are found in the lowlands. The higher plains are generally table lands or plateaus, but the great plains of North America rise almost imperceptibly from sea level to 6,000 ft. The interruption of mountain ranges or steep escarpments rather than mere elevation delimits the plain. Plains may be due to denudation or accumulation. Marine plains are old sea floors now above sea level, such as the Atlantic and Gulf coastal plains of North America.

**Plainfield**, city, New Jersey, 24 m. s.w. of New York City. It is a residential city with considerable industrial interests. The picturesque First Mountain, a continuation of Orange Mountain, lies on the n.w. Manufactures include auto trucks, newspaper presses, silk, silk hosiery, women's dresses, pneumatic tubes, concrete machinery and machine tools. Hundreds of New York business men live in Plainfield, which has express service on the Central Railroad of New Jersey; p.37469.

**Plains of Abraham**, hills s.w. of Quebec. See ABRAHAM, HEIGHTS OF.

**Plain-song**, **Plain-chant**, **Gregorian Chant**, or **Gregorian Music**, terms for an ancient unmeasured form of sacred music set to passages contained in Holy Writ, and used in the service of the Church since the beginning of the Christian era. Its distinguishing points are its recitative-like character, the *modes*, or scales, in which it is written, which are more numerous and varied than the mod-

ern major and minor; and its being (originally) sung in unison. The cultivation of plain-song has received great impetus from the instructions on church music given to the Roman Catholic Church by Pius x. in 1903, in which he strongly advocated the use of Gregorian music.

**Plaintiff**, a person in whose name a civil action is commenced. He may be acting in his individual or a representative capacity, as where one sues as trustee. In some States of the United States, one who maintains an action in equity is known as the complainant.

**Planarian**, a term which may be applied to practically all the members of the class Turbellaria, a division of Platyhelminthes, or flat-worms. Planarians are small, oval, or elliptical, leaf-life creatures which are almost all free-living, and which are found in the sea, in fresh water, and occasionally in damp earth.

**Planchette**, a piece of board shaped like a heart, mounted on supports, two of which are casters fixed at the broader end, with a pencil at the other, so that it moves easily over a sheet of paper when hands are placed lightly on it. This instrument was at one time believed to write independently of the volition of the person touching it; but its action is now explained by the 'dominant idea,' which influences the hands of the operator. See OUIJA BOARD.

**Plançon, Pol-Henri** (1854-1914), French operatic singer, was born in Fumay, France.

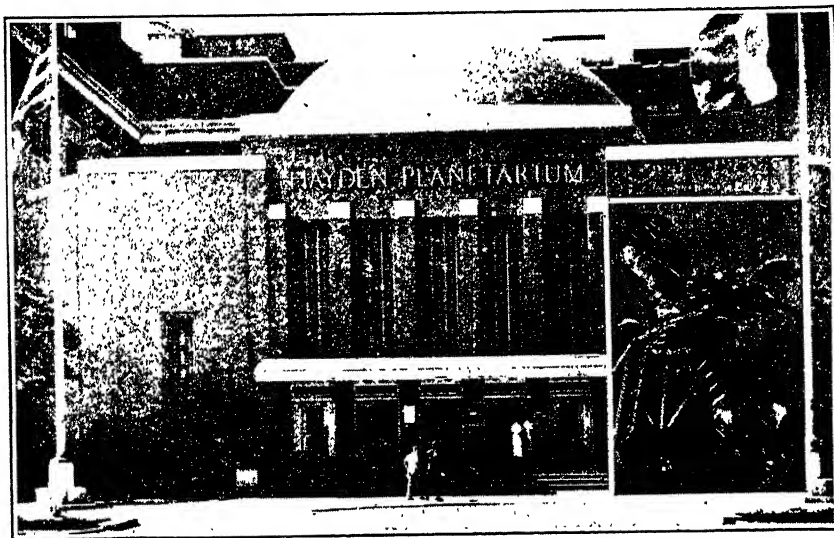
**Plane Geometry** deals with the properties of co-planar lines and points; but the theory of planes themselves belongs to the geometry of space, also called solid geometry. Geometry tells us that we completely determine a plane when we know on it (1) two intersecting straight lines, or (2) one line and a point without it, or (3) three non-collinear points, or (4) two parallel lines (not necessarily straight lines). It will be observed that a plane has only two dimensions—length and breadth, whereas a solid has three—length, breadth, and depth; a line, one only—length; and a point, none.

**Planet**, so called in contradistinction to a 'fixed' star, is an opaque body, permanently revolving round the sun at a distance of from 186 million to some four billion m. The ancients knew five planets:—Mercury, Venus, Mars, Jupiter and Saturn. Modern astronomers have added the Earth, Uranus, Neptune and Pluto, making nine in all. Secondary planets are the satellites, or bodies that revolve around the primary planets.

Primary planets are further classified as 'inferior' when they revolve inside the earth's orbit. Such are visible only in morning or evening twilight; they are bound to the vicinity of the sun; the angle of maximum elongation can in no case reach  $90^\circ$ . Their apparent motions are direct from w. to e.—at superior, retrograde at inferior conjunction; while at elongations, their velocities being radially directed to or from the earth, they seem stationary. The superior planets show retrogradations only when nearly opposite to the sun, while stationary periods mark the limits of each 'arc of regression.' Owing to the inclinations of their orbits to the

—an artificial inverted hemispherical dome—in which are projected the sun, moon, planets, and stars. It can be so operated that any and all apparent motions connected with ordinary or extraordinary astronomical phenomena of the heavens can be shown. In 1937, due to the tremendous cost of these planetaria, the projector alone selling at about \$150,000, only four cities in the United States support one—Chicago, Philadelphia, Los Angeles, and New York.

**Plankton.** A term applied collectively to all those animals which swim about near the surface of any body of water, as the sea or a lake.



*Planetarium, New York City. General view of building. Inset—Giant Projector*

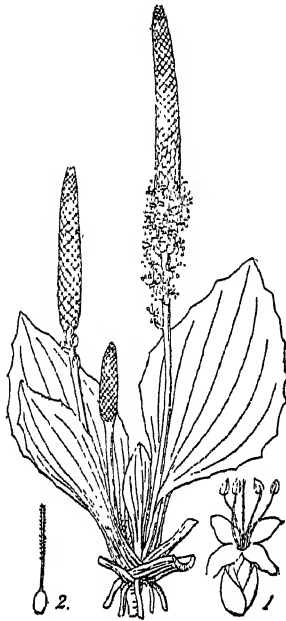
ecliptic, the planets do not simply return upon their own tracks in executing their oscillations in longitude, but pursue looped paths, representing their simultaneous deviations in latitude. Mercury, Venus, and Mars rank with the Earth as 'terrestrial planets.' They are bodies of the same order of magnitude of not very dissimilar density, and advanced geological age. The exterior planets, on the contrary, are giants in size, and bear the stamp of inchoate globes. They are of slight consistence, possess profound and turbulent atmospheres, and rotate swiftly, but unequally, in drifts and zones.

**Planetarium,** a machine for representing the motions and orbits of the planets. The name is given specifically to an arrangement, for creating mechanically the illusion of a sky

**Plantagenet, Family of.** The name first appears in the rolls of Parliament in 1460, having been adopted by Richard, Duke of York, to express the superiority of his house over that of Lancaster. The name, however, is sometimes applied to the whole Angevin dynasty, which occupied the throne from 1154 till 1485, and included Henry II., Richard I., John, Henry III., Edward I., Edward II., Edward III., Richard II., Henry IV., Henry V., Henry VI., Edward IV., Edward V., and Richard III.

**Plantain (*Plantago*),** a genus of herbaceous plants belonging to the order Plantaginaceæ. The only species grown in gardens is *P. brasyliensis*, which bears whitish flowers in a dense cylindrical spike. Several species, however, are common weeds.

**Plantain-eaters**, or **Turacos**, a family of birds (*Musophagidæ*) peculiar to Africa. The coloring is usually metallic blue or green, often varied with crimson; the red feathers contain a peculiar soluble pigment called turacin.



*Plantain.*

1, Single flower; 2, germin.

**Plantin, Christophe** (c. 1514-80), French printer, born at St. Avertin, near Tours; established at Antwerp one of the largest printing-houses in Europe. His greatest work is the Antwerp Polyglot Bible (8 vols. 1569-73). He was also the owner of printing-houses at Paris and Leyden. In 1876 his Antwerp printing-house, together with its collections, was opened as the Musée Plantin.

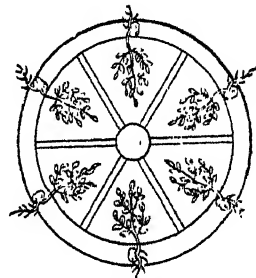
**Plant-lice.** See **Aphids**.

**Plants**, the term broadly applied to living organisms endowed with vegetable life in contrast to animal life, in general non-sentient. The chief purpose served by plants is the provision of food for the whole animal world. Moreover, the part they play in the interchange of gases renders the air fit to be breathed by animals, which in return give off carbon dioxide utilized for plant food. Practically the whole surface of the earth is covered with vegetation of one kind or another, from the giants of the forests to the herbage

of the meadows, the lowly desert plant and the lichen of the rock.

Plant physiology is concerned with the functions necessary for the well-being of the individual and the propagation of the species. These may be looked on as forming a cycle, of which movement, growth, respiration, nutrition, and reproduction are the important stages in the higher plants, and constitute the life-history of those that consist of a single cell. In the lowest plants there is a certain amount of locomotion. In diatoms and desmids progress through the water is effected by means of protrusile threads of protoplasm thrust through the cell wall. Heliotropism, or the action of light on vegetable life, may be observed in window plants, the stems of which bend toward the window, while the leaves assume a position at right angles to the light. On the other hand, the tendrils of the vine and Virginia creeper turn away from the light. To gravitation is due the downward growth of primary roots and the horizontal growth of lateral branches.

The simplest plants consist of single cells, and the higher plants originate as single cells, and growth is carried on by cell division and specialization. The former takes place at the growing points above and below, except in the case of the lateral roots, which arise at some distance from the tip, where the tissues have already begun to differentiate. The next phase is that of elongation, due to surface growth in the cell wall, and the distension of the cell by the absorption of water. Internal organs are developed by the fusion of cell



*Knight's Experiment, showing that the normal direction of root and stem is due to gravity.*

cavities and the thickening of cell walls; and periodicity of growth may be observed corresponding to the alternations of day and night and of the seasons with their periodical changes of light and temperature. Growth is most rapid in spring, after the retardation of

the vital processes in winter, which allows of the accumulation of reserve material.

Respiration, or the absorption of oxygen, and the evolution of carbon dioxide, is as necessary for plants as for animals. When a plant is deprived of oxygen, all vital processes are suspended; and if it is kept in the same atmosphere, the destruction and disorganization of the living substance inevitably follow.

Nutrition is a general term, covering all the processes by which the plant body is built up, from the absorption of nutritive material in solution from the soil to the accumulation of reserve. Carbon is derived by a plant from the atmosphere, chiefly by the leaves; oxygen and hydrogen are obtained from the water absorbed by the roots, which also brings in the necessary mineral substances from the soil.

Reproduction, which implies separation, rejuvenation, and multiplication of the individual, is effected asexually and sexually. Asexual reproduction may take place by the division of a single cell, when growth limits are reached, as in the single-celled algæ; by the formation of spores; or by vegetative increase by stolons, rhizomes, or tubers; and to this third method the general name of budding is applied. Sexual reproduction is more complicated; but, reduced to its simplest terms, it consists in the development of two sexual cells or gametes, neither of which can of itself give rise to a new organism. But from the fusion of these two cells a third cell (the zygote) is produced, which is the starting-point of a new plant. The process is somewhat masked by the alternation of generations. See BOTANY, FUNGI, FLOWERS, FRUITS.

**Plasma.** See **Blood**.

**Plasma**, a variety of chalcedony, which has a dark-green or leek-green color, due to the admixture of minerals belonging usually to the chlorite group. It takes a good polish. At present it is principally obtained from India, where it occurs in the cavities of weathered igneous rocks.

**Plaster and Plastering.** The application of a coat of plastic material to the surfaces of masonry or of woodwork, for the purpose of bringing the latter to a sufficiently smooth surface to receive surface decoration, is known as plastering. Upon ceilings, or wooden partitions, the several coats are applied upon laths of wood or on wire netting or lathing. In ceilings, however, it is customary to add a finishing coat, containing calcium

sulphate, or of what is commonly called plaster of Paris.

**Plaster of Paris**, obtained by cautiously heating gypsum in kilns or continuous furnaces out of contact with fuel to about 120° c. It is a fine white powder that sets rapidly with expansion to a hard solid after being mixed into a paste with water. It is utilized for cementing objects together, and for copying objects of every description.

**Plastics**, a large group of organic, often synthetic, materials. Some are proteins, as nylon; some are cellulose derivatives, as Plastacele; and some are resins formed by polymerization, as Lucite and Plexiglas. They are cast or molded and used for making many articles. Celluloid and Bakelite are early plastics. World War II spurred research on old and search for new plastics.

**Plata, Rio de la, or River Plate**, inlet of e. of S. America, between Argentina and Uruguay, forming the estuary of the Parana and Uruguay rivers. Length, 130 miles.

**Plataea**, a city in Bœotia, ancient Greece, at the northern base of Mount Cithæron. Its history turns on its refusal to join the league of Bœotian cities dominated by Thebes. In 510 or 509 B.C. it formed an alliance with Athens. The Athenians had at once to fight the Bœotians. The Peloponnesian War began with an unsuccessful attempt (431 B.C.) by the Thebans to seize Plataea. The Peloponnesians besieged Plataea (429-27 B.C.) and captured it by starvation, the town being razed to the ground.

**Platanus**, a genus of trees belonging to the order Plantanaceæ. The sycamore or buttonwood (*P. occidentalis*) has coriaceous, pubescent leaves. The bark of this sycamore has the habit of splitting off in thin, broad scales, leaving the upper part of trunk and branches blotched with white. Its round balls of fruit hang on the trees over the winter. It is found in rich soil, particularly in moist lands along streams, and reaches to a great height (130 ft.) and girth (50 ft.); its reddish-brown wood is used chiefly in making cigar-boxes, although compact, hard, and difficult to work.

**Plateau** means either a high level plain, or an elevated part of a mountain system shut in by bordering chains, and in some cases traversed by mountain ranges or by a tableland. A submarine plateau is a steeply bordered elevation in the sea floor.

**Plating.** See **Electro-deposition**.

**Platinum** (Pt., 195.2), a metallic element occurring in alluvial deposits or in rock-form-

ing minerals, is found principally in the Ural mountains, in Colombia, and in the United States, where the principal deposits are located in Alaska, in Butte, Humboldt, Plumas, Sacramento and Yuba counties, California, in Southwestern Oregon, and along the Gila River in Arizona. Native or crude platinum occurs usually in small glistening granules of a steel-gray color, which always contain, along with some gold, copper, iron, and sand, an admixture, in varying proportions, of several metals—iridium, rhodium, palladium, osmium, ruthenium—most of which are rarely found except in association with platinum. Sometimes, however, it is found in masses of the size of a pigeon's egg, and pieces weighing 10 or even 20 pounds have occasionally been known. Crude platinum is obtained by two methods—hand sluicing and dredging.

Platinum is a tin-white metal of metallic lustre, tenacious, malleable, and ductile. It melts at the high temperature of  $177^{\circ}\text{C}$ ., has a specific gravity of 21.5, and is about as hard as copper. It is a poor conductor of electricity, is easily welded at red heat, and is particularly valuable in having a coefficient of linear expansion (.0000907 at  $50^{\circ}\text{F}$ .) approximately equal to that of glass, thus allowing wires to be sealed into glass vessels without the latter cracking on cooling—a feature of especial importance in the manufacture of electrical apparatus. Platinum, particularly when in a spongy form prepared by heating some of its compounds, has the remarkable property of bringing about the union of oxygen and hydrogen. In a similar way it brings about the union of sulphur dioxide and oxygen to form sulphur trioxide, a process employed commercially in the manufacture of sulphuric acid by the contact process.

Platinum is used chiefly for making and covering various apparatus and utensils for use in the chemical laboratory, as crucibles, spoons, blowpipe points, boilers, and tongs. It is employed also in the manufacture of concentrated sulphuric acid, essential in the production of explosives, and for incandescent lamps. The metal is used extensively in photography, and in the manufacture of jewelry, especially as a setting for precious stones. The known supply of platinum is small, and is rapidly diminishing with the exhaustion of the mines in the Ural Mountains. Formerly a minor producer of platinum, the U. S. since 1938 has been filling a large proportion of its platinum needs from deposits within its own borders.

**Plato**, the central figure in Greek philosophy, was born in 427 B.C., of an aristocratic Athenian family. He was a pupil of Socrates from whom he acquired that moral conviction of the value of knowledge for life, and of the vital connection between knowledge and life, which continued to mark his thinking. The condemnation and death of Socrates in 399 B.C. broke up the circle of his disciples, and Plato among others seems to have fled to Megara. During the next ten or twelve years he is said to have traveled widely, visiting, among other places, Egypt, Cyrene, the Greek colonies in Italy, and finally Syracuse, then governed by the tyrant Dionysius. On his return to Athens about 388 B.C. he founded the school afterwards famous as the Academy, and settled down to the study and teaching of philosophy.

The writings of Plato have come down to us in a much more complete and finished state than those of most of the other great thinkers of antiquity. Yet Plato apparently attached much less importance to his writings than to his oral teaching. In the *Phaedrus*, a dialogue which has been regarded by some as a sort of inaugural discourse, written at the time of the foundation of the Academy, writing is contrasted to its disadvantage with the patient husbandry of the Socratic method of discussion. And his writings themselves take the form of dialogue, which is evidently a literary reproduction of the Socratic conversation. In most of them Socrates himself is represented as the chief interlocutor, though, of course, as Plato's philosophy develops, the thought goes far beyond the scope of actual Socratic teaching.

The early group includes (1.) a sub-group of three 'Socratic' dialogues, so called because they appear to go but little beyond the master's teaching, the *Laches*, *Charmides*, and *Lysis*, the last of which is concerned with friendship, while the two former work out for the virtues of courage and temperance the Socratic thesis that 'virtue is knowledge.' (2.) There may also be placed in the early group the *Apology*, which is not a dialogue, but appears to give the defence of Socrates at his trial; and the two dialogues, the *Euthyphro*, wherein Socrates, who was charged with impiety, is made to show how little the popular mind has grasped the nature of the piety it extols; and the *Crito*, in which Socrates is shown, after his condemnation, as nobly accepting the decision of the law, and refusing to avail himself of his friends' offers to aid him to escape. The remaining dialogue



connected with the trial and death of Socrates, the *Phædo*, which represents the last scenes in the prison, and includes a discussion of the immortality of the soul.

The late group includes, besides the *Laws*, which is the latest of all, and the *Timæus*, which contains Plato's cosmological theories a group of five very abstract and difficult dialogues in which fundamental, speculative, ethical, and political questions are discussed. These five are the *Theætetus*, the *Philebus*, perhaps the most important of all the later dialogues; and a group of three (the *Parmenides*, *Sophist*, and *Politicus*).

The remaining dialogues that call for mention come probably somewhere between the early and the late group. In the *Protagoras*, we find Plato pushing the hedonistic aspect

is usually regarded as being, from a purely literary point of view, the most perfect of all the dialogues. The theme of these two dialogues is love in its highest form, in which it appears as an exalted and spiritual yearning for a supersensible beauty that can be found only in an ideal world. It is in this central group of dialogues that the famous theory of Ideas begins to take more and more definite shape. But the theory comes to more decisive expression in the *Phædo* (already mentioned), and again in the greatest of all the dialogues, the *Republic*.

This great work has been thought by some to reflect in its several parts different stages of Plato's philosophical development; but however this may be, all the parts of the finished work belong now to a single struc-



Plattsburgh, N. Y.: R.O.T.C. Training.

of the Socratic ethics to its logical conclusion by identifying the good with pleasure—a position, however, which, if he ever really accepted it, he soon abandoned. In the *Gorgias* the good life and the life of pleasure are sharply opposed. These two dialogues also portray the two famous Sophists whose names they bear. Plato treats them with respect even while he criticises them freely, but in the amusing or at times farcical dialogue, the *Euthydemus*, where he is dealing with Sophists of a very different type, mere verbal quibblers, he shows us the degradation which the Socratic method of discussion underwent in the hands of men utterly devoid of serious purpose, and eager only to show off before their bewildered audience. On the other hand, when he sets himself, in the *Phædrus* and *Symposium*, to show us in allegorical fashion the true spirit of philosophy, all his literary skill is brought to bear on the task, and the *Symposium* in particular

ture, and in its large and complex plan almost all the chief topics of the Platonic philosophy are represented. The discussion is by turns ethical, political, theological, educational, psychological, metaphysical, and æsthetic, as the many windings of the argument require. We are brought to the highly important discussion of the nature and objects of philosophical study, and the method of a philosophical education, and are shown, in a fully elaborated contrast, the stages in the deterioration of the state and the individual soul which have once lapsed from their true justice or goodness. Plato is not averse to the use of fiction for didactic purposes, and the *Republic* concludes with one of those stories or myths which are a frequent device in the dialogues. In it he pictures for us the destiny of the soul in a morally governed world in which justice is rewarded and injustice punished.

The absolute good, or idea of the good, be-

comes for Plato the ultimate ground and interpretation of all reality, and the aim of all science would be attained in so far as we could rise to the knowledge of this supreme good, and see everything in the light of it. And it is in virtue of this twofold conviction that the truest realities are not those revealed by the senses, and that through all reality a single purpose or meaning runs, that Platonism has ever been the type of an idealistic philosophy.

**Platt, Charles Adams** (1861-1933), American painter, etcher, architect, and landscape architect, was born in New York City, and studied art at the National Academy school and at the Art Students' League in that city, continuing in Paris. His landscapes include *Early Spring* (1884), *Clouds* (1894), and *Snow* (1900). He was an early member of the N. Y. Etching Club, and devoted much attention to the art, notable specimens of his work being *The Market Slip*, *Low Tide*, *St. John, N. B.*, *On the Connecticut River*, and many Dutch scenes. In later years he gave much attention to landscape architecture and to architecture.

**Platt, Orville Hitchcock** (1827-1905), American politician, born at Washington, Ct. He was in the Connecticut Senate or House from 1855 to 1869 and was U. S. senator from 1879 until his death. He is best known as the author of the so-called 'Platt Amendment' which governed the relations between Cuba and the United States, until it was superseded in 1934 by independence for Cuba.

**Platt, Thomas Collier** (1833-1910), American politician, was born in Owego, N. Y. In 1872 he went to New York City to start a Republican newspaper. In 1878 he became manager of the United States Express Company, and in 1879 its president. He served two terms in Congress (1872-6), and in 1881 was chosen United States Senator but, with Roscoe Conkling, resigned in May of that year in protest against appointments in New York by President Garfield. He gained complete control of the Republican organization in the State. He was United States Senator (1897-1909).

**Platte National Park.** See **National Parks.**

**Platte River, or Nebraska River,** right branch of the Missouri, rises in Northern Colorado in two forks, known as the North and South Platte Rivers, which unite near North Platte City, Neb. The main river flows through Nebraska easterly through a broad

bottomland, to its junction with the Missouri below Omaha. During most of the year the main river is dry for several hundred miles through Nebraska. The drainage area is 90,011 sq. miles; the length of the main stream is 315 miles; including the North Platte, 825 miles.

**Platteville,** city, Grant co., Wisconsin. Features of interest include the State normal school, city park, and the picturesque natural scenery of the region and of the Platte River valley. The chief commercial interests are in the mining of lead and zinc. The city is also a shipping point for cattle, hogs, and dairy products; p. 4,762.

**Plattsburg,** city, New York, county seat of Clinton co., on the w. shore of Lake Champlain at the mouth of the Saranac River. The town is beautifully situated on Cumberland Bay, where the Battle of Plattsburg was fought in 1814, and commands a fine view of the Green Mountains and of the lake. It has a State normal school, a public library, and several philanthropic institutions. Notable buildings and features of interest are the court house, custom house, City Hall, and the historic Delord House, headquarters of the British army commanders during the Battle of Plattsburg. Plattsburg Barracks, a United States military post, established in 1838, is situated on the outskirts of the town. It was the seat of a large military training camp during World Wars I and II; p. 16,351.

**Plattsburg, Battles of.** During the Revolutionary War a small American fleet under Gen. Benedict Arnold was defeated Oct. 11, 1776, off Valcour Island, near the present site of Plattsburg, by a superior fleet under Sir Guy Carleton. Though greatly shattered, the American ships withdrew in good order, and not a prisoner was taken. During the War of 1812 the town was the headquarters of the American forces on the northeast frontier. In September, 1814, a joint land and naval attack was made by the British. After their defeat, the fleet retreated to Canada, and no further attacks were made during the war.

**Platyhelminthes, or Flat-worms,** a division of the animal kingdom which contains such important parasites as flukes or trematodes, and tapeworms or cestoda, as well as planarians or turbellarians. The platyhelminthes are bilaterally symmetrical animals, with flattened bodies, which in the more primitive forms are leaf-like. Platyhelminthes are divided into three classes—(1) the Turbellaria, which are free-living; (2) the Tre-

matoda, which are mostly external parasites; and (3) the Cestoda, which are internal parasites. Structurally they illustrate the progressive degeneration associated with parasitism.

**Platypus.** See **Ornithorhynchus**.

**Plautus, Titus Maccius** (c. 254 to 184 B.C.), comic poet of ancient Rome, was a native of Sarsina in Umbria. In early life he was a servant to actors. His plays appear not to have been published during his life-time, but to have been left in the hands of the actors, who probably both interpolated and omitted passages to suit them for the stage. Of the twenty-one plays legitimately assigned to him all but one are extant. They are mostly imitations from the Greek Plautus. He is witty and humorous, his characters are life-like, and his plots on the whole satisfactory. His Latin is particularly pure and vigorous. Several modern writers have copied him closely. Shakespeare's *Comedy of Errors* is based on the *Menæchmi*, and Molière's *L'Avare* on the *Aulularia*; Dryden, Addison, and Lessing are among his imitators.

**Play**, originally free or brisk movement or action; hence amusement, recreation, a game or, more broadly, any activity carried on with no definite object in view other than personal satisfaction. Children have engaged in play from the earliest times of which any record exists, and many of the games of today have their counterpart among the peoples of ancient times. From the point of view of play, childhood is generally divided into three periods. The first period, which lasts until about the sixth year of age, is the imitative stage. In it the child does everything that he sees his elders do. He loves to run and jump and climb, but his play is seldom organized into a real game. The second period is from the age of six to twelve or thirteen, the period of the elementary school, and is the stage of individual competition, as witness the game of tag and of hide and seek. The third and last period begins at about thirteen or fourteen and it is in this period that the team spirit is developed and a spirit of co-operation arises in games like baseball, cricket, and football. Play is the most serious activity in which the child engages, and it must not be confused with the recreation of adults, which is relief from toil. Recreation may vary in form, but it is never serious and is valuable only in recreating the mind and body for the more serious work of life. The play of a child should constitute physical,

intellectual, and moral training for future development.

Everything indicates that nature intends the child to be active, his first interests and achievements are physical, and repeated tests show that children under six years old cannot sit still for more than thirty seconds. The early years of life offer the chief opportunity for physical training, and almost the only method during this period is play. The more vigorous the exercise, as in tag, roller skating, and baseball, provided, of course, it does not overtax the child's strength, the larger the spaces to play in, the more interesting the game, and the more varied the use of different muscles, the better will be the results. Play tends to develop physical efficiency, a good chest, a bright eye, a good digestion, and robust health.

Among primitive peoples the child's education comes almost entirely from his play. In the age of Pericles at least half of each school day was devoted to organized games and athletics. The amount of energy that a person has at his command is one of the great determining factors in life, and there is little question that play is a great source for the development of energy. Play, which represents the life of the past, which is social in its very nature and requires friendship and comradeship, which develops accurate judgment, a sense of justice, and a sense of honor, is a good preparation for living. See **PLAYGROUNDS**. Consult Publications of the Playground and Recreation Association of America.

**Playgrounds.** Organized play is in reality older than organized education, having had its beginnings in the far distant past, when in Persia, Greece, and Rome a course of games and athletics was the center of all educational systems. The modern playground movement dates from about the beginning of the twentieth century, having arisen largely out of the new psychology which makes the child the center of educational activity. In every country in Europe this movement has been fairly well developed; while Japan has made a good beginning, and there have been a few attempts in Korea, China, and India. The greatest interest, however, has been shown in America, where the movement is primarily a social one, designed to keep the child off the streets. Boston seems to have been the pioneer in this matter, as an organized playground was opened in one of its school yards in 1868. Twelve years later

New York City opened some thirty playgrounds under the Board of Education.

**Playing Cards.** See **Cards, Playing.**

**Plays.** See **Drama.**

**Plea**, in the general sense, denotes any proceeding at law, but more technically is restricted to certain answers open to a defendant in an action or suit. In action at law, pleas (in the more technical sense) are of several kinds, and are classified as dilatory and preemptory. Dilatory pleas are grounded on some alleged defect in the plaintiff's case arising either out of want of jurisdiction in the court before which the action has been

jection to the jurisdiction of the court; (2) a plea in abatement; (3) a special plea in bar, such as formerly acquitted or convicted on the same charge, or a pardon; or (4) he may plead the general issue of not guilty.

**Pleadings.** At the common law, after the issue of a writ or summons and an appearance has been entered in an action, the parties deliver the pleadings, which contain a summary of the material facts of the case for the guidance of the other parties and the judge. Only facts must be stated, and not arguments or evidence. Pleadings have been greatly simplified under the reformed pro-



*Gowanus Playground, Brooklyn, N. Y.*

brought, or in respect that it has been brought against the wrong defendant, or that it is premature, or that the form of the action is bad. Preemptory pleas go directly to the root of the plaintiff's case, either by denying the facts on which he founds, or by alleging others which entirely alter the complexion of the case. Demurrers which take exception to the law, as opposed to the facts, on which the plaintiff relies are sometimes included under preemptory pleas though properly distinct. In criminal prosecutions the accused is called upon to plead to the indictment. He may plead guilty, but if he advances an answer or plea, it must be either (1) an ob-

cedure of England and the United States, and may now be amended in case of error.

**Pleasantville**, borough, Atlantic co., New Jersey, on Lake Bay. It is a residential place. Lake Bay is the center of a large oyster industry, for which Pleasantville is the shipping point; p. 11,050.

**Pleasantville**, village, Westchester co., New York, is situated 32 miles northeast of New York City; p. 4,454.

**Plebiscite**, originally a term used in ancient Rome to denote a resolution of the *plebs* or commons formally passed at their regular assembly, the *Concilium Plebis*. At first such resolutions were only binding on the plebians

themselves; but after 287 B.C., by a law of Hortensius, such resolutions, though not laws, were equally binding on all Roman citizens, and, in fact, most important measures were thus carried. In modern times it is practically synonymous with a referendum to the body politic.

This method was used at the close of the French Revolution to determine the status of various annexations, and after the Great War there were several plebiscites taken, notably in Schleswig-Holstein and Upper Silesia. Another notable plebiscite was in the Tacna-Arica question. The Saar plebiscite took place in January, 1935, under League of Nations supervision. See SAAR.

**Plebs**, or **Plebeians**, in ancient Rome, the common people. Intermarriage between plebeians and patricians was forbidden until 445 B.C. Under Servius Tullius the whole body of citizens, patrician and plebeian was formed into the *Comitia Curiata*, or national assembly. This history of Rome from 509 to 300 B.C. is that of the equalization of the two orders. One after another the plebs broke down all patrician privileges, until patrician birth became a mere pride of lineage. After the equalization of the orders a plebeian nobility arose, based on the tenure of high public office. From 300 B.C. onwards this nobility counted for more at Rome than patrician birth.

**Pledge**, in English and American law, personal property delivered over as security for a debt. Almost any personal property may be pledged, subject, however, to a few exceptions, such as the pay of an officer, and further subject to the requirement of delivery, for without delivery of the article to the pledge there is no pledge at law. It differs in this from a chattel mortgage. In a pledge title remains with the pledgor and never passes to the pledgee, who only acquires a right to sell the article under statutes and subject to statutory regulations. The holder of a pledge is bound to take reasonable care of it, and is liable for negligence, but a pledgee may make reasonable use of the article while it is in his possession. A pledgor may redeem the pledge until a sale with notice has been had, and he may sell it, giving the vendee all his rights.

**Pleiades**, a conspicuous star cluster in Taurus, which figures popularly as the Seven Stars, though only six are commonly visible, the discrepancy being accounted for by the world wide tradition of a 'lost Pleiad.' Keen eyes, however, can discern many more than six Pleiades; Maestlin reckoned 14, Littrow 16. The brighter components are of helium type. Phot-

ographs of the pleiades exhibit it as densely nebulous.

**Pleiades**, in ancient Greek legend, the seven sisters of the Hyades. The story runs that in Bœotia the hunter Orion pursued them, and the gods to whom they prayed for deliverance turned them into doves and placed them among the stars.

**Pleiocene**. See **Pliocene**.

**Pleistocene System** (Gr., 'most recent'), a system which comprises the older accumulations belonging to the Quaternary or Post-Tertiary division. In North Europe, and central and southern mountain regions of that continent deposits consist for the most part of glacial and fluvio-glacial detritus which betoken the former presence of a great ice-sheet. The remains of northern and Arctic plants and animals are met with both in glaciated countries, and in the caves and fluvial deposits that occur in regions that never were covered with glacier ice. The relics of man himself also accompany the same flora and fauna. The Pleistocene period was distinguished by great climatic oscillations. During the Pleistocene period a depression occurred along the Atlantic coast, and the subsequent elevation gave rise to many lines of raised beaches, as in the terraces of the Hudson Valley and along Lake Champlain. The Pleistocene fauna of North America embraced *Mastodon*, a true elephant, species of horse, bison, beaver, peccary, bear, etc., and gigantic extinct forms of sloth, such as *Megatherium*, *Myloodon*, and *Megalonox*.

**Plenipotentiary**, a diplomatic representative invested with full power to settle all the affairs connected with the special commission for which he is appointed, subject to the ratification of his government. Meetings of such plenipotentiaries are generally held in some neutral country, so that they may settle treaties and terms of peace without the interference of any particular power.

**Plesiosaurus**, a large extinct marine reptile of predaceous habits, which inhabited the Mesozoic seas. Different species range from 10 to 40 ft. in length. They had a comparatively small and lizard-like head, borne on a long and flexible neck. The body was relatively not of great size, apparently unprovided with bony armor, and carried two pairs of long, powerful paddles or flippers. The tail was stout, and about as long as the body.

**Plethora**, a term used in medicine to express a state of general full-bloodedness, non-pathological, and not to be confused with the pathological conditions of congestion and inflammation.

**Pleurisy**, inflammation of the pleura, is one of the commonest of the serious inflammations. Apart from pandemics of influenza, the most common causes of pleurisy are tuberculosis and pneumonia. Occasionally a tuberculous pleurisy is due to the extension of a tuberculosis of the bones of the chest, or of the peritoneum, but in the majority of cases it is associated with tuberculosis of the lungs. The characteristic symptoms of pleurisy are pain and cough. There are, as a rule, some rise of temperature, shallow, rapid breathing, and small, hard pulse. Applications of hot fomentations are of service in mitigating the pain and in checking the extension of the inflammation.

**Pleurodynia**, a form of muscular rheumatism characterized by paroxysmal pain in the intercostal muscles, sometimes of such intensity as to simulate pleurisy.

**Pleuropneumonia**, a term sometimes used to denote the occurrence of pneumonia complicating pleurisy. In veterinary medicine pleuro-pneumonia is synonymous with *pleuropneumonia contagiosa*, as lung plague. For which see CATTLE.

**Plevna**, city, Bulgaria, on a tributary of the Danube; particularly known as the scene, in 1877, of a series of battles between the Turks and Russians, and of the memorable siege, September to December, when Osman Pasha, after a heroic defence, surrendered with 40,000 men; p. 25,000.

**Plimsoll, Samuel** (1824-98), British reformer, known as 'the sailors' friend,' was born in Bristol. His trenchant attack on shipowners led to the passing of the Merchant Shipping Act, 1876, which empowered the Board of Trade to detain any vessel deemed unsafe, restricted the amount of cargo, and rendered compulsory on every ship a mark (known as the Plimsoll mark) indicating the maximum load-line. Plimsoll resigned his seat in 1880.

**Pliny the Elder** (23-79 A.D.), whose full name was GAIUS PLINIUS SECUNDUS, spent the years of Nero's reign (55 to 68) in studious retirement. Vespasian made him one of his intimate friends, and appointed him admiral of the fleet at Misenum. When the great eruption of Vesuvius took place in 79, Pliny, who landed at Stabiae in order to observe the phenomenon more closely, was overcome by the noxious fumes. His one surviving work is his *Natural History*, which contains 20,000 important facts, collected from over 2,000 books.

**Pliny the Younger** (61-c. 114), whose full name was GAIUS PLINIUS CAECILIUS SECUNDUS, was a nephew and the adopted son

of the elder Pliny. His works are a panegyric on Trajan, and ten books of letters, the last of which, containing his correspondence with Trajan while he governed Bithynia, is of particular interest.

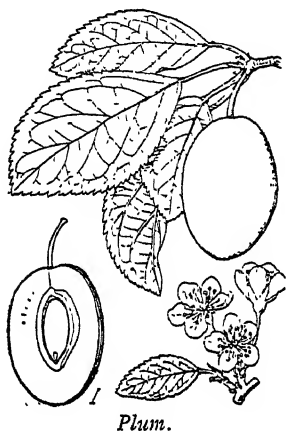
**Pliocene**, a geological period immediately preceding the glacial. Part of the auriferous gravels of California belong to this period. Volcanic activity continued through the Pliocene. The plateau region was greatly elevated, rejuvenating the streams and making possible such canyons as the Colorado. The Pliocene beds of Attica (Greece) have yielded many interesting mammalian fossils. Pliocene life was very modern in character. The mastodon, elephant, rhinoceros, horse, were prominent. Much discussion also has centered around the discovery of a man-like skeleton in Java, *Pithecanthropus erectus*.

**Plotinus** (c. 205-270 A.D.), the founder of the Neo-Platonic system of philosophy, was a native of Egypt. He was probably of Roman descent. His theories are based on those of Plato. The stress he laid on the purely mental source of knowledge, insisting that thinking alone led to truth, gave a tone of mysticism to his teaching; his followers practiced a kind of meditative trance rather than an observation of nature. Our knowledge of his works is due to his pupil Porphyry, who arranged them in their present form.

**Plover**, a general name applied to many of the limicoline birds of the sub-family Charadriinae. What may be regarded as the typical plovers belong to the genus *Charadrius*, and are well exemplified by the golden plovers, several closely similar species of which inhabit the northern parts of both the Old and New Worlds, breeding on the northern moorlands. Their general color is black, spotted with yellow above, with white markings on the head and sides. In winter the black under parts become white. The eggs, generally four in number, are prized as food.

**Plum**, an orchard stone fruit belonging to genus *Prunus* widely grown in all temperate climates. It is closely related to the peach but is generally smaller and has a smooth skin and stone. A number of species are native to America. The European plums which are grown chiefly in the Eastern States include such well known varieties as Lombard, Green Gage, and Damsons. The Japanese plums are successfully grown in all of the Southern States, north as far as Vermont, and west of California. The tree is a hardy, vigorous grower and best adapted of all sorts to grow in the South. Plums may be grown on nearly all well-drain-

ed soils. The plum orchard requires clean cultivation during the early part of the season, followed by a cover crop the latter half. All native and most Japanese varieties are self sterile, and in order to insure fruitfulness varieties must be mixed in the orchard. Firm, sweet-fleshed varieties of plums that can be successfully cured are called prunes. These are extensively grown in the Pacific States, where favorable conditions exist for drying them.



1, Section of fruit.

**Plumbago**, a genus of plants belonging to the order Plumbaginaceæ. Most of the species require greenhouse cultivation. *P. capensis* is a beautiful dwarf greenhouse climber, with pale-blue flowers in summer and autumn.

**Plumbing**, a general term covering the tanks, pipes, traps, fittings and fixtures in a building for conveying water and for the disposal of sewage. It is applied, also, to the trade concerned with the installation of such equipment. Any plumbing system includes a water supply system and a drainage system.

**Plumule**, the end of the axis of the infant plant (destined to develop into the stem) as distinguished from the other end.

**Plunket, William Conyngham**, First BARON PLUNKET (1764-1854), British statesman, became a peer and Chief Justice (1827); and was Lord Chancellor of Ireland (1830-41). Consult *Memoir* by How.

**Plunkett, Sir Horace Curzon** (1854-1932), Irish public official, was educated at Eton and at Oxford. From 1879 to 1889 he was engaged in cattle ranching in the western United States and on his return to Ireland was active in promoting agricultural cooperation.

His publications include *Noblesse Oblige: an Irish Rendering* (1908); *The Rural Life Problem of the United States* (1910); *A Better Way: an Appeal to Ulster not to Desert Ireland* (1914).

**Plush**. See **Fabrics, Textile**.

**Plutarch**, ancient Greek biographer, was born about 40 A.D. He visited Italy, and lectured at Rome on philosophy during Domitian's reign. His *Parallel Lives* are the lives of 46 famous Greeks and Romans, arranged in pairs for comparison; each pair consisting of a Greek and a Roman. He wrote other Lives also, which have not come down to us.

**Pluto**, the 9th major planet of the solar system, of the 14th to 15th magnitude. The existence of this body had been predicted in 1915 by the late Professor Percival Lowell, in his *Memoir on a Trans-Neptunian Planet*. The actual discovery was made in March, 1930, by Clyde W. Tombaugh, a 24-year-old assistant at the Lowell Observatory at Flagstaff, Arizona. The event created a great sensation, and it was reported that years of study would be needed to determine the facts. Consult H. N. Russell, *More About Pluto* (*Scientific American*, Dec. 1930).

**Pluto**, in ancient Greek mythology, the god of the lower regions, called by Homer Hades. He married Persephone, the daughter of Demeter (Ceres), after forcibly carrying her off, for which act her mother refused to allow the fruits of the earth to grow until her daughter was permitted to return to the upper world for a part of each year.

**Pluvius**, 'the rainy,' a title given by the ancient Romans to Jupiter, as the giver of rain.

**Plymouth**, municipal, parliamentary, and county borough and important seaport, England. Northeast of the Hoe is Sutton Pool, an inlet of the Sound, from which the 'Mayflower' sailed in 1620. Plymouth has a large foreign and coasting trade and is the point of departure for many passenger vessels to all parts of the world.

**Plymouth**, town, Massachusetts, county seat of Plymouth co., on Plymouth Bay. It is a summer resort and the oldest town in Massachusetts, the landing place of the Pilgrims from the Mayflower in 1620. One of the chief objects of interest in the town is Plymouth Rock, taken from the place of landing. Burial Hill and Cole's Hill contain the graves of early settlers, and there are many historic houses. Plymouth is also an important center; p. 13, 100. The town celebrated its tercentenary with a pageant, widely attended, in 1920. Consult

Davis' *History of the Town of Plymouth and Bradford's History*.

**Plymouth**, town, Connecticut, Litchfield co., on the New York, New Haven, and Hartford Railroad; 22 m. s.w. of Hartford. Important industries are the quarrying of granite, wood turning, and the manufacture of malleable iron, oven thermometers, and automatic screw machines. A cabinet lock factory located here is said to be one of the largest of its kind in the world. Plymouth includes the village of Terryville; p. 6,043.

**Plymouth**, City, Indiana, county seat of Marshall co. It has lumber, planing and flour mills, foundries, and manufactures of wagons, barrels, gas engines, and grinding machines. It is in a lumbering and agricultural district, and much grain is shipped; p. 5,713.

**Plymouth**, town, New Hampshire, county seat of Grafton co., on the Pemigewasset River, and the Boston and Maine Railroad; 40 m. n.w. of Concord. It is a popular tourist and summer resort, and the seat of a State normal school. Products include buckskin gloves and sporting goods. Here Nathaniel Hawthorne died; p. 2,533.

**Plymouth**, city, Wisconsin, Sheboygan co. It is in a rich farming district, with extensive cheese and dairy interests. Manufactures include furniture, foundry and machinshop products, and flour; p. 4,170.

**Plymouth Brethren**, a Christian sect which since 1830 has extended throughout the British dominions, and other parts of Europe, particularly France, Switzerland, and Italy, and in the United States. Its origin may be ascribed to John Nelson Darby (1800-82), from whom the Brethren on the Continent are generally known as *Darbyites*. He withdrew from the Church of Ireland because of a revolt against ministerial ordination and in 1830 founded at Plymouth the congregation now known by its place of origin.

The tenets of the Brethren in general are founded on the most literal interpretation of the words of Scripture, each one of which is regarded as directly inspired. The Lord's Supper is celebrated every Lord's Day, or 'first day of the week.' The distinctive peculiarity of the sect, in comparison with other Calvinistic churches, is its complete rejection of ecclesiastical organization. Practically any brother may preach or pray, but those 'not gifted with utterance' are quietly discouraged from officiating. The Brethren own comparatively few church edifices, usually meeting in halls or private houses.

**Plymouth Colony**. The founding of the

Plymouth Colony was one of the great events in the early history of the American colonies. During the reign of Queen Elizabeth of England, a party of Brownists, one of the sects of Puritans, took refuge from persecution in Holland. They could not reconcile themselves to a country alien in manners and speech, however, and they determined to emigrate to America. Crossing from Delft Haven, in Holland, they sailed to Southampton, England, were joined by others, and embarked in the *Mayflower* for America (Spt. 6, 1620.)

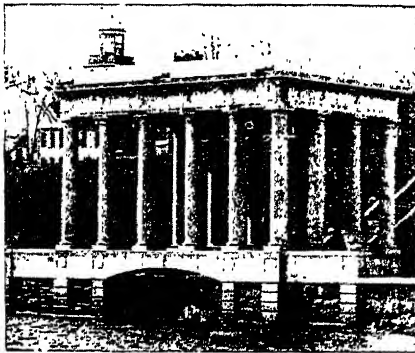
When they reached the American coast, strong winds drove them into the neighborhood of Cape Cod. Here they decided to remain, and after some exploration settled on the site of Plymouth, Mass. They numbered in all about 100, and during their first year had many troubles to face. Fully half of the original colonists were dead when the second shipload of pilgrims, numbering about 30, arrived in the fall of 1621. In 1623, 60 other colonists came over. After many difficulties concerning food, the French of the Maine coast, religious observances and intolerance, and new charters, Plymouth Colony was united in 1691 with other New England colonies to form the Massachusetts Bay Colony.

**Plymouth Company**. As a result of the voyage of Bartholomew Gosnold, James I. of England in 1606 granted a charter to the Virginia Company to settle Virginia, which was the name then given to all the Atlantic coast of the United States. The new company was divided into the London Company and the Plymouth Company, the latter being empowered to settle between lat. 38° and 45° N. The Dutch had already established trading posts at New York and Albany; but New England was still a wilderness when Sir George Popham and Sir Ferdinando Gorges sent out the first band of colonists under the Plymouth Company (1607). These numbered 120, and settled on the west bank of the Kennebec River, in what is the present State of Maine. They were half starved and frozen, and had all returned to England by the end of 1608. After Captain John Smith had explored the New England coast for the company, further attempts were made to form colonies, but these failed.

**Plymouth Rock**, the portion of rocky ledge in the harbor of Plymouth, Mass., on which the Pilgrim Fathers first set foot when they landed from the *Mayflower* in December, 1620. Through the efforts of the Society of Mayflower Descendants, Plymouth Rock, which in 1834 had been moved to a position in front of Pilgrim Hall and later covered with



a canopy, has been restored as nearly as possible to its original position at the edge of the water, where a simple but beautiful new canopy covers it.



Copyright, A. S. Burbank, Plymouth Rock.  
Canopy Covering Plymouth Rock.

**Plymouth Rock**, a breed of domestic fowls. See **Poultry and Poultry Farming**.

**Plymouth Sound**, an arm of the English Channel, between Devonshire and Cornwall, one of the famous roadsteads of the world.

**P.M.**, *post meridiem*, 'after noon'; *post mortem*, 'after death.'

**Pneumatic Appliances**, or mechanical devices involving the use of air, range from simple air-filled cushions to pumps, tools, and engines worked by a steady supply of air. The earliest record of the use of compressed air as a motive power dates from about the year 1700, when Denis Papin, in England, compressed air by means of power derived from a water wheel, and transmitted it through tubes to a distance. In 1853 pneumatic power was first utilized for commercial purposes in London, England, when a tube 220 yards long was constructed to carry telegraphic despatches. The first successful application of compressed air on a large scale was made in 1861 in connection with the construction of the Mont Cenis Tunnel.

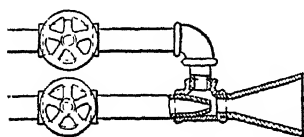
The U. S. Post Office Department in 1893 installed a system of pneumatic despatch at Philadelphia. Pneumatic appliances may be considered under seven heads. (1) Compressed air has a wide application in a large variety of apparatus wherein a simple mechanical push or pull is required—ranging from a tiny camera shutter, worked by a rubber bulb and hose, to a large foundry hoist. (2) The foundations for quay walls, dock entrances, and the piers of bridges are often sunk to the required depth by means of cylinders or caissons, from which water is excluded by forcing in air at a pres-

sure of from 10 to 30 lbs. above that of the outer atmosphere. This high pressure is confined by a strong partition or diaphragm to the working chamber, admission to which is gained by means of an air lock. A similar system is used in tunnelling with the hydraulic shield through water-bearing strata. In these cases the working length of tunnel is cut off by a temporary wall, pierced for the air lock and for the pipe supplying compressed air. The air lock for tunnel shields is horizontal, for foundation caissons vertical. This is a method of construction used in the tunnelling under the Hudson River for the Pennsylvania Railroad's tracks to New York City. (3) Attempts to use compressed air as a propelling force in military and naval practice have been confined to guns of large calibre, and to the discharge of projectiles containing high explosives. The air was stored in tubes close to the gun at a pressure of 1,000 lbs. per square inch, and was admitted to the breech of the gun through a valve, so controlled that the range of the projectile was governed by the amount of air allowed to pass. No great success was attained, however, and the guns were eventually discarded. (4) The conveyance of parcels through the tubes.

(5) Transmission of power is effected by compressing air at a central station, and supplying it to consumers through a radiating series of main pipes, branching into others of a less diameter. The chief system is in Paris, and comprises 140 miles of mains, air being supplied at a pressure of 75 lbs. per square inch, with a loss of 18 per cent. on the outside of its zone. (6) For use as a motive power in locomotives and automobiles, air is stored at a high pressure (1,000 to 4,000 lbs. per square inch) in a steel reservoir carried on the car, and is admitted thence at a working pressure of 100 to 150 pounds into the driving cylinder. While compressed-air locomotives and trucks are still employed to some extent, their use is now confined to special applications. Electricity has supplanted them in most cases. (7) The force of suction obtained by exhausting the air in a confined space is used in such appliances as grain elevators. In these the grain is drawn up through a flexible pipe into the receiver of the elevator, from which it either descends through an air lock into barges below, or is forced by air pressure through a pipe leading to the top of the warehouse. Shavings from wood-working mills are handled by a similar system.

Domestic suction or vacuum cleaners have come into such general use during recent years

that they must be classed among the most important pneumatic appliances. A great variety of forms are seen, but all of them consist essentially of a suction pump (generally motor driven), a dust catcher, and a gathering nozzle and pipe. A large variety of common air appliances may broadly be termed 'aspirators' and 'atomizers,' these having fundamental similarities. When a fluid (air, vapor, or liquid) is forced through a tube or across the end of another tube, it draws along with it particles of any fluid in the second tube, creat-



*Pneumatic Paint Sprayer.*

Slide feed for paint; flattened conical nose piece to project spray in thin sheet.

ing a suction therein, or aspirating the fluid contained. If air thus entrains a liquid, a spray emerges—that is, the device atomizes. The common laboratory aspirator air pump does not entrain air, but is a simple displacement device. Atomizers range from small perfume hand sprays to large painting machines, requiring a considerable supply of compressed air. Somewhat similar devices are used in sand blasting and in spraying cement on walls. Compressed air blows the mixture much as it does paint. In sand blasting the dry sand is blown directly against the surface to be cleaned. Glass surfaces are frosted in this manner.

**Pneumatic Despatch**, the name given to a method of sending parcels through a comparatively narrow tube by means of compressed air at a speed of from 500 to 1,000 yards a minute. In the United States, where a closed-circuit system is employed, great progress has been made in the use of pneumatic power for post office work. Cylinders of steel 7 by 24 inches, weighing about 13 lbs., and having a capacity of about 800 cubic inches, are loaded with letters (up to 600), or whatever is to be sent, and by an ingenious arrangement are introduced into the tube without interrupting the current. They are propelled at the rate of the current, and on arrival at the terminus are delivered into an air chamber which stops them, also without interrupting the current. In New York City, the three most important post offices—Grand Central, Pennsylvania

Station, and the General Post Office—have a set of tubes from each of the other two; and from these, branch tubes run to other central points throughout Greater New York. The tubes from the General Office to the Grand Central Station (3½ miles), with three intermediate stations, carry 6,000 lbs. of letters daily at the rate of 7 minutes each way.

**Pneumatics** is the study of the properties of gases; but the term has fallen somewhat out of use, and it is now more customary to discuss the different aspects of the question under the particular branches of physics concerned. See **GASES**.

**Pneumatic Tires**, flexible tubes, inflated with air, mounted on the rim of a wheel, were first developed in connection with the bicycle, and later modified and improved for motor car application. The first bicycle tires were of solid rubber. These were followed by 'cushion tires,' of nearly twice the diameter, and having a small central air space. The next step (J. B. Dunlop, 1888) was to make the diameter larger and the walls thinner, and to provide a valve for inflating. Some of the tires were 'single tube,' with the inner rubber skin, strengthening fabric, and outer coat all vulcanized together. Others were 'double tube,' with a thin inner envelope separate from a heavier outer casing. The double-tube type alone has survived in automobile service, on account of its greater ease and permanence of repair. In some bicycle tires the outer casing had a small laced slit along its inner circumference, through which the inner tube was inserted and removed. There were also several 'clincher' designs employing an endless inner tube and an easily detachable casing. These were the prototypes of the modern automobile tires, for which, see **MOTOR CARS: Wheels and Tires**.

**Pneumatic Tools**. Prominent among pneumatic appliances in general is a most useful group of tools for working stone and metal particularly. This group includes percussion, coal punchers and cutters, riveting hammers, chisels, etc. *Percussion Drills* consist essentially of a cylinder and piston with the drill steel held firmly in a chuck on the end of the piston rod, together with a valve gear for admitting and exhausting compressed air (or steam) alternately from either side of the piston, the whole being supported on a tripod or bar with a hand-feed carriage. Compressed air enters through the valve chest on top, and is let out above or below the piston by a double-spool air-thrown valve, whose

position is governed by the auxiliary arc valve which is thrown by the piston. The upper end of the piston is rifled, and engages a coarse screw or rifle bar on a ratchet to give the piston and bit the small constant rotation necessary to prevent the drill from sticking. The long screw and handle underneath advances the drill on its support as the rock is penetrated.

Air-driven *Channeling Machines*, now extensively used in quarrying, are engine-driven carriages traveling back and forth on short tracks, and carrying a cutter which makes a deep groove or channel in the quarry floor—a first step in separating the stone blocks from the vein or ledge. *Coal Punchers and Cutters* are also important. The former are essentially percussion air drills mounted on low trucks or wedged columns, and used to cut into the coal vein preparatory to throwing down part of the face. The cutters are usually low trucks with a motor driving a bar, disc, or endless chain, equipped with bits and mounted on an outstanding arm. Electric motors are steadily supplanting air engines for coal cutters. There are a variety of rotary air drills, etc., embodying some sort of a small rotary engine and tool chuck. In most of these devices, however, the motor has reciprocating pistons that impart a rotary motion to the drilling spindle by the usual crank.

**Pneumatic Trough**, a round, rectangular or other suitable vessel used for the collection of gases over a liquid—usually water. It was invented by Priestly, and for use is filled with the liquid; the jars or cylinders destined to hold the gas are filled and inverted in the liquid, and supported on a shelf or perforated tray called a 'beehive,' through which the gas is bubbled up into the jar, displacing the liquid.

**Pneumogastric Nerve**, the 10th cranial nerve which, from its wide distribution, is often called the *Vagus* (or wanderer).

**Pneumonia**, an acute, febrile disease characterized by inflammatory reactions in the lungs or bronchi. It is generally described as of three varieties: *lobar* or *croupous* pneumonia; *lobular*, catarrhal, or broncho-pneumonia; *chronic interstitial* pneumonia. It occurs at all ages, but is rare in the first year of life. It frequently follows other acute infections and is often seen post-operatively. In 1941 the extensive use of sulphonamide drugs helped to reduce the death rate from pneumonia from 33% to 10%. Since then the death rate has dropped even lower.

**Pneumonoconiosis** or **Pneumonokoniosis**, a disease of the lungs due to the inhalation

of dusts, especially those encountered in the metallic industries, characterized by fibrosis of the lung tissue.

**Pnom-Penh**, capital of Cambodia, French Indo-China, at the confluence of the Mekong with an arm of the Tale (or Tonle) Sap; 130 m. n.w. of Saigon. It exports rice, pepper, fish, cotton, tobacco, cardamoms, gamboge, sugar cane, indigo, maize, silk, betel tortoise shells, and skins. Since 1894 Pnom-Penh has been transformed into a place of European appearance; p. 83,000.

**Po** (ancient *Eridanus* and *Padus*), the largest river of Italy, rises in the Cottian Alps, at the northern foot of Monte Viso, at an altitude of 6,400 ft. close to the French frontier. The Po discharges principally by the branch known as the Po della Maestra. The total length is 355 m., while its basin covers some 29,000 sq. m. The Po is navigable from above Turin. From Piacenza to the sea it is protected by embankments on both sides. It has always been difficult to cross, owing to its width and the great volume of its waters.

**Poa**, or **Meadow Grass**, a large genus of grasses widely distributed in temperate and cold countries, having six colored spikelets arranged in open panicles. The June Grass or Kentucky Blue Grass (*P. pratensis*) found in fields and meadows throughout the United States and in British Columbia is one of the best-known species.

**Poaching**, though originally a popular rather than a legal term, has come to be generally used to denote the offense of entering on the lands of another in pursuit of game without permission from the proprietor, deer stealing, and also of fishing under like circumstances in waters belonging to another. See GAME LAWS.

**Pobiedonostzeff, Constantine** (1827-1907), procurator of the Holy Synod of Russia, was born in Moscow. He was strongly opposed to liberal reforms, and especially to religious tolerance, and thereby stirred up bitter hostility, which culminated in an attempt on his life in July, 1905. His chief work is *Reflections of a Russian Statesman* (1898).

**Pocahontas**, (c. 1595-1617), daughter of an Indian chief, Powhattan, famous especially for her reported rescue of Captain John Smith from death at the hands of the Indians. Pocahontas was brought a prisoner to Jamestown by Captain Argall in 1613, was converted to Christianity, and in 1614 married an Englishman. John Rolfe, with

whom she went to England in 1616. She left one son, and a branch of the Randolphs and several other Virginia families claim descent from her.

**Pochard** (*Nyroca ferina*), a European duck belonging to the same genus as the American Canvasback and Redhead Ducks, and like those species, much prized for the table.

**Pocket Mice, Pocket Gophers**, are names given to various burrowing rodents of the interior plains and prairies of North America. They are provided with pocket-like cavities in the cheeks external to the mouth, where they stow quantities of food, which is then carried to some place of concealment, emptied out, and eaten at leisure.

**Pocono Mountain**, a ridge in Monroe and Carbon counties, Pennsylvania; 2,000 feet.

**Pod**, the capsule or seed vessel of any dry and several-seeded dehiscent fruit, especially the legumes.

**Podagra** signifies gout in the foot.

**Podargidæ**, a family of birds nearly allied to the true Goatsuckers or Nightjars. They are at home in New Guinea and Australia, are arboreal and nocturnal in their habits, and feed on large insects, which are mostly caught about trees.

**Podiebrad, George Boczeko of** (1420-71), Bohemian king, was born of a noble family at Podiebrad, and became an adherent of the moderate party of the Hussites. He was made regent (1451) during the minority of Ladislav and on the death of Ladislav was chosen his successor, and was crowned early in 1458. Paul II., promulgated against him the ban of excommunication and deposition in 1466, and Matthias Corvinus of Hungary took the field to enforce it. The hostilities which ensued were brought to an end by Podiebrad's death.

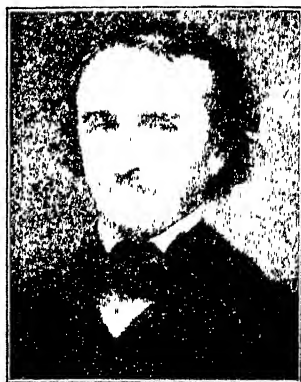
**Podocarpus**, a large genus of evergreen trees of the pine family (*Conifera*), chiefly natives of tropical countries, with succulent leaves and fruit.

**Podophthalmata**, a term sometimes used for a division of Crustacea in place of Thoracostraca. See CRUSTACEA.

**Podophyllum**, a genus of hardy herbaceous perennial plants belonging to the order Berberidaceæ. *P. peltatum* is a perennial plant, common in North America, growing in moist woods and on the shady banks of streams, and is known as *May Apple*, also *Hog Apple*, *Wild Lemon*, and *Mandrake*. The root is used in medicine. The leaves are drastic and poisonous.

**Poe, Edgar Allan** (1809-49), American

poet, romancer, and critic, one of the most picturesque characters in American literature, was born in Boston, Mass., on Jan. 19, 1809. Orphaned at Richmond in his third year, Edgar was adopted by John Allan, a wealthy and childless merchant of Richmond, Va., who educated him as his own son. Early in 1827 Poe parted from Mr. Allan and went to Boston. Here he published his first volume, *Tamerlane and Other Poems*, by a Bostonian, a pamphlet of 40 pages. His second volume, *Al Aaraaf, Tamerlane, and Minor Poems*, appeared under his name at Baltimore, 1829, 71 pages.



Edgar Allan Poe.

During his stay in Baltimore Poe had lived with his aunt, Mrs. Clemm, whose young daughter, Virginia, he married on May 16, 1836. Her sweet and gentle nature was the one controlling power over Poe's restless spirit, and he loved her devotedly. He established himself in Philadelphia in the summer of 1838. For a year (1841-2) he edited *Graham's Magazine*, then in the forefront of American literature. His wife's dangerous illness, caused by the rupture of a blood vessel while singing, disheartened him, and weakened his always slight power of self-direction. A second prize of \$100, won in 1843 by his wonderful story *The Gold Bug*, saved the little household from starvation or near it. In April, 1844, Poe removed to New York, and from October to March following assisted Willis on *The Evening Mirror*. Here *The Raven* appeared (Jan. 29, 1845), and won immediate fame. In 1845 he published a volume of *Tales*, and *The Raven and Other Poems*. In the spring of 1846 he occupied the cottage at Fordham (now a part of New York City) which is

associated with the poet's name. Here, on Jan. 30, 1847, in deepest poverty, Virginia Poe died, an attractive and pathetic figure, retaining her fragile and childish beauty to the last; she was but twenty-four. Her mother was more than a mother to the poet, and his home life drew out what was best in his nature, and afforded such measure as he attained of happiness. In the summer of 1849 Poe visited the South in connection with one of his magazine projects, and in Richmond became engaged to Mrs. Shelton, a well-to-do widow. Starting North to arrange preliminaries for the marriage, he was found in a comatose condition at Baltimore on Oct. 3, and died at the Marine Hospital on Oct. 7.

Poe's poetry, limited in theme and quantity, is among the most musical and imaginative in the language. His stories have for sixty years served as models for French writers; and perhaps of all our creative authors Poe has greatest claim to be considered a cosmopolitan. His best work in verse and fiction rises into the loftiest realm of art, and is independent of any associations of time or place. His criticism, personally vindictive at times, at its best was good medicine for the gushing 'literati' of his period. In his own walk he stands unsurpassed, if not alone, with a halo of mystery, gloom, and terror about him. Consult Ingram's *Life, Letters*, etc.; H. Allen, *Israfel* (1926); M. E. Phillips, *Edgar Allan Poe* (1926); J. W. Krutch, *Edgar Allan Poe* (1926).

**Poerio, Carlo** (1803-67), Italian patriot, was born in Naples. Denounced as a revolutionist in 1850, he was condemned to twenty-four years' imprisonment. Gladstone and others took up his cause, and Poerio and his companions were ordered to America, but escaped and returned to Turin (1859). After the victories of Garibaldi, Poerio went back to Naples, where he became vice-president of the parliament (1861).

**Poet Laureate.** The precise origin of this office, which is a royal appointment in Great Britain, is not known; but it is certain that Chaucer, on his return from abroad, assumed the title. The first poet laureate in the modern sense was Edmund Spenser, while Ben Jonson was the first to receive the office by formal letters patent. The following were poets laureate: Edmund Spenser (1591-9), Samuel Daniel (1599-1619), Ben Jonson (1619-37), William Davenant (1660-8), John Dryden (1670-88), Thomas Shadwell (1689-92), Nahum Tate (1692-1715), Nich-

olas Rowe (1715-18), Lawrence Eusden (1718-30), Colley Cibber (1730-57), William Whitehead (1757-85). Thomas Warton (1785-90), Henry James Pye (1790-1813), Robert Southey (1813-43), William Wordsworth (1843-50), Alfred Tennyson (1850-92), Alfred Austin (1896-1913), Robert Bridges (1913-30), John Masefield (1930- ).

**Poetry** is the first form in which mankind expresses its emotions or records its doings; and yet in no department of intellectual activity has it been so difficult to arrive at an adequate definition. The idea lying at the root of the word is restraint, a moulding of language into a definite form such that the human ear can recognize the scheme of harmony and be led to anticipate its recurrence. In all languages, poetry precedes prose in its order of appearance. The earliest forms of verse are narrative poems and religious hymns. The lyric is a later form, which makes its appearance only when civilization has so far progressed that the individuality of each member of the tribe is clearly recognized as something distinct from that of the tribe as a whole. An early species of composition in most languages is the didactic poem, in which the rules of husbandry, or it may be the tribal code of morals, are thrown into metrical form with a view to their easier memorizing. See the articles in this work on CRITICISM, LITERARY; ENGLISH LITERATURE; UNITED STATES, LITERATURE; the sections on literature in the articles on the several countries; and the biographies of the poets.



Raymond Poincaré.

**Poge, Cape**, the n.e. point of the Martha's Vineyard group of islands, on Chappaquidick Island. It has a lighthouse over 50 ft. above sea level.

**Poggio Bracciolini, Gian Francesco** (1380-1459), Italian humanist, was born in

Terranuova, near Florence. His most famous book is the *Liber Facetiarum*, a collection of humorous and not over-decent stories and jests, written in fair Latin, at the expense of the monks and secular clergy.

**Pogrom**, a word which came into use in connection with revolutionary outbreaks in Russia (1905-06) as a general term for an unprovoked attack by the authorities upon Jews or other classes.

**Poincaré, Jules Henri** (1854-1912), French mathematician and physicist, was born in Nancy. He made original contributions in pure mathematics, in celestial mechanics, and in the mathematics of physics, and was the recipient of many prizes and medals, including the Sylvester medal of the Royal Society of London (1901).

**Poincaré, Raymond** (1860-1934), French public official, was born in Bar-le-Duc, and was educated at the College of Nancy. In 1912 he became Premier and Minister of Foreign Affairs, his premiership being signalized by a succession of important French initiatives in connection with the Near Eastern crisis, while in home affairs he identified himself with electoral reform and proportional representation. He was President of France (1913-20, and 1922-4), and once more in 1926 was Premier and Minister of Foreign Affairs. He stabilized the franc, and set the country on the road to recovery. He resigned because of illness in 1929, and declined an offer of the premiership in 1930. He was elected leader of the French bar in 1931.

**Poinciana**, a species of tropical leguminous trees of the genus *Casalpinia*, with showy scarlet or orange flowers. The Royal Poinciana is familiar in Southern Florida.

**Poindexter, George** (1779-1853), American public official. In 1819 he was elected governor of Mississippi, notwithstanding attempts to unseat him. From 1830 to 1835 he was a member of the U. S. Senate. Poindexter's pronounced views on Federalism led to his fighting a duel with Abijah Hunt (1811), whom he killed. The accusation was made that he had fired before the signal was given, but it was never substantiated.

**Poindexter, Miles** (1868- ), American legislator, was born in Memphis, Tenn. He was U. S. Senator from 1911 to 1923, when he was appointed Ambassador Extraordinary and Plenipotentiary to Peru. He held this office until 1928.

**Poining**, in the law of Scotland, is the general process by which the goods of a debt-

or are seized and made available to his creditors.

**Poinsett, Joel Roberts** (1779-1851), American diplomat, was born in Charleston, S. C. He was a member of Congress from 1821 to 1825, and advocated the cause of the South American republics and of Greek independence. From 1822 to 1829 he was U. S. Minister to Mexico, and from 1837 to 1841 Secretary of War in President Van Buren's Cabinet.

**Poinsettia**, a South American shrub of the order Euphorbiaceæ, a noted greenhouse plant of many countries. It grows to a height of six ft. or more, and bears small yellow or green flower heads surrounded by large vermillion bracts.

**Point-à-Pitre**, town and port, Guadeloupe, French West Indies; 20 m. n.e. of Rasse Terre. It is of considerable commercial importance, having exports of sugar, cacao, and vanilla. The harbor is commodious and sheltered; p. 26,455.

**Point Barrow**, the most northern point in Alaska. It is a whaling center, has a trading post and a government relief and life-saving station. In 1881-3 the U. S. Signal Corps established an international polar station and system of meteorological stations here.

**Pointer**, a smooth-coated bird finding and retrieving dog, whose name indicates its method of standing rigid when it scents the proximity of game, and pointing with its nose.

**Point Pleasant**, or **Great Kanawha**, **Battle of**. In American history a battle fought in the present state of West Virginia, Oct. 10, 1774, between colonial troops and Indians. As a result of the battle the Indians made a treaty by which they surrendered their prisoners and all claim to land south of the Ohio. See Roosevelt's *Winning of the West* (1889).

**Poiré, Emmanuel** (1858-1909), known as 'Caran d'Ache,' French caricaturist, born in Moscow, his grandfather being one of Napoleon's soldiers. The grandson returned to France, and under his pseudonym (Russia, for 'lead pencil') became celebrated. He contributed political cartoons to the *Figaro*, and won great fame by *L'Épopée*, a series of 2,000 portraits of celebrated men who helped to win Napoleon's victories. His *Cheque Book*, issued during the Panama scandal, made quite a stir.

**Poisonous Plants** are those that contain some principle capable of destroying animal life. Among the most virulent poisons known are those obtained from the vegetable king-

dom. J. D. Mann, in his *Forensic Medicine* (1900), gives the following list of the most important plants from which alkaloids are obtained: *Strychnia*, *nux vomica*, *Cocculus indicus*, deadly nightshade, henbane, thorne-apple, woody nightshade, Indian hemp, *Gelsemium sempervirens*, Indian tobacco (*Lobelia inflata*), tobacco, hemlock, foxglove, meadow-saffron, hellebore, aconite, and laburnum. It must not be forgotten that some of the above are valuable remedies in skilled hands. Plants poisonous to the touch are few, fortunately, but the two sumachs, *Rhus vernix* and *Rhus radicans* (the latter best known as poison ivy), and occasionally; *Cypripedium*, cause tormenting, itching inflammations. Other plants, such as lupines (*Lupinus*), death camas (*Zygadenus*), larkspurs (*Delphinium*), and the notorious loco weeds (*Astragalus*) are destructive to live-stock. Children are in danger of eating the roots of pokeweed (*Phytolacca*), poison-hemlock (*Conium*), water-hemlock (*Cicuta*), and elderberry (*Sambucus*); and are, too, frequently poisoned by the seeds of *Datura*, buckeye (*Æsculus*), etc., while poisonous mushrooms destroy their elders. See Chestnut's *Principal Poisonous Plants of the United States*, 1898 (*U. S. Dept. Agric. Div. Bot. Bull.* 20).

**Poisons.** Substances that act upon living tissue in such a way as to impair its processes or destroy its life. Most drugs are poisonous in excess of certain quantities. Poisons are variously classified, according to their effect, as corrosives, irritants, narcotics, convulsants; or by their chemical nature, as alkaloids, acids, organic or inorganic. Violent symptoms, such as pain, retching, vomiting, diarrhoea, giddiness, or convulsions, coming immediately or soon after the taking of food, hint at poison. The middle-aged and young adult are, generally speaking, less susceptible than children and the aged. Arsenic, one of the irritant poisons, can be taken in large quantities by those who have gradually become accustomed to its use. Some poisons do not allow of gradually increasing doses, but, on the contrary, are cumulative in their action, being stored in the tissues and perhaps working with deadly results after their use has been discontinued. Trional, digitalis, and strychnia are examples. Corrosive poisons—such as sulphuric, nitric, and carbolic acids—produce a sensation of burning as they pass down the throat. The lips and mouth may immediately show staining and blistering; the throat swells, and swallowing and breathing becomes difficult. There is intense pain in the stomach, with vomiting,

possibly of mucous membrane, and purging. Corrosives may act as irritants if taken in comparatively small quantities; but arsenic, phosphorus, croton oil, tartar emetic, copper, and zinc compounds may be considered typical examples. In acute irritant poisoning the symptoms are much like those of corrosives, but not quite so rapid or violent. In chronic poisoning through repeated small doses, discomfort after food, loss of appetite, occasional pain and vomiting, with a general appearance of illness and wasting. Common sources of unintentional poisoning are matches (phosphorus), carbolic acid, salts of sorrel (oxalic acid), vermin killer (strychnine), laudanum, chlorodyne, paregoric, and Dover's powder (opium), also hypodermic injection of morphia. Arsenic has been mistaken for sugar; and poisoning is frequently the result of abortifacients, such as strong purgatives, irritants such as cantharides, lead (as diachylon), ergot of rye, savin, and others. Badly-tinned meat and fish, sausages, contaminated mussels and oysters, frequently give rise to ptomaine poisoning.

**Poisson, Siméon Denis** (1781-1840), French mathematician, was born at Pithiviers. He was especially noted for his application of mathematics to physics, investigating such subjects as the invariability of the axes of the planets, capillary phenomena, and the mathematical theory of heat.

**Poitiers**, chief tn., dep. of Vienne, France, 60 m. by rail s. by w. of Tours, on a height between the junction of the Clain and Boivre. It has some Roman remains; the church of St. Hilaire le Grand, in which rest the remains of the famous bishop of Poitiers (?320-368); the church of St. Radegonde, long a place of pilgrimage; and a cathedral, founded in 1161 by Eleanor of Aquitaine, queen of Henry II. of England. The victory of Charles Martel over the Saracens in 732 is named in France after this town, though it occurred at some distance in the direction of Tours. Poitiers is an episcopal see; p. 33,439.

**Poker**, an American game of cards which depends for its interest on the wagering of money. The full pack of 52 cards is used, and any number from 2 to 7 may play. Before the game is commenced an equal number of counters are given to each player. These counters, called chips, are usually small celluloid disks; red, white, and blue in color, each color having a definite money value. At the conclusion of the game the chips are cashed in.

Before the cards are dealt, the player on the left of the dealer (the age) must put up on the table one-half the amount agreed upon as

the ante (called the blind), which amount remains constant through the game, except that before the deal the player on the left of the age may 'straddle the blind' by putting up double the amount, and the players to his left may restraddle in turn until the last straddle equals one-half the amount agreed upon before the game as the limit of a single bet. The cards are then dealt, one at a time, until each player has five. The player on the left of the age then looks at his hand and decides whether or not to play. If his hand warrants it he will put into the pot twice the amount of the blind or straddle less anything he may have already put into the pot, or he may increase the amount to be played for up to the limit, which is called raising before the draw. The other players then follow in order until no more raises are made, the age having the last say. The age then discards from his hand the cards he does not want and calls for an equal number to take their place from the dealer. He may draw any number of cards up to five or may take none. The other players follow, the dealer being the last to take cards. After this has been done the betting begins, with the player on the left of the age first to bet. If he bets on his hand each player in turn around the table may 'see' the bet by putting in an equal amount, or raise it by putting up more money, or withdraw. The last bet is always with the age unless he withdraws. After the betting has ceased the cards are laid on the table, provided more than one player has not withdrawn, and the highest hand wins. If any player has bet, and no one has met his bet, he may take the stakes without showing his hand.

The order of value of hands is as follows: Royal flush, cards of the same suit in sequence, the highest in the pack. Straight flush, a sequence all of one suit. Fours, four cards of a kind, such as four aces. Full hand, three cards of a kind and a pair, such as three aces and two kings. Flush, five cards all of one suit. Straight, a sequence not all of one suit. Three of a kind. Two pairs, two cards of each of two kinds and an odd card, such as two aces, two kings, and a two spot. Pairs, two cards of one kind, such as two aces, and three odd cards, such as a king, queen, and jack. Ace high, such as ace, ten, eight, seven, six of odd suits. The latter is the lowest count. Ace may be counted at either end of a straight, being low or high depending upon which end.

**Pokeweed**, a large succulent plant, branching widely and bearing long, glossy, lanceolate leaves and stiff racemes of saucer-like white

flowers, succeeded by dark purple berries, occasionally used for ink. The thick root is violently poisonous.

**Pola**, seaport town, Italy, formerly the most important naval station of Austria-Hungary, is situated near the southern extremity of the Istrian peninsula; 105 m. by railroad s. of Trieste. The harbor is thoroughly sheltered, deep, and spacious. The cathedral dates from the 15th century. Wood, fish, and building stones are exported. Pola is of ancient origin, and has fine Roman remains. It belonged to Venice 1148-1379; was destroyed by Genoa; reverted to Venice; was seized and held by Austria 1815-1918; p. 36,047.

**Polacca**, a three-masted square-rigged vessel peculiar to the Mediterranean.

**Poland**, country of Europe, divided by successive 'partitions' (1772, 1793, 1795, 1939) between Russia, Austria, and Prussia, constituted as a nation during the Great War of Europe. The area of Poland is about 149,000 sq.m.; this area is divided into 16 voyvodships or provinces; the capital of the country is Warsaw. Poland lies in a vast productive plain stretching northward from the Carpathian Mountains, with the River Vistula in the center, the Oder on the w., and the Dnieper on the e. The mineral wealth of the country is considerable, particularly in the south, where coal and iron are extensively mined. Petroleum, salt, and zinc also exist in large quantities, as well as copper, chalk, marble, brick clay, and kaolin.

The soil is generally fertile and nearly 60 per cent. of the land is arable. The chief crops are rye, wheat, potatoes, sugar beets, oats and barley. Horse and cattle breeding are popular, and pigs and goats are raised. There are vast forests in the n. and in Galicia. Textiles, paper, chemicals, sugar, and metal goods are manufactured, and commerce is aided by many miles of navigable rivers. The population was on January 1st, 1939, approaching the 35 million figure. There are six universities, of which the Jagiellonian University in Craców is the most famous. The others are in Warsaw, Lwów, Poznań, Wilno, and Lublin. There are also two Polytechnic institutes in Warsaw and Lwów, a Mining Academy in Craców, an Academy of Commerce in Warsaw, an Academy of Fine Arts in Craców, and several others.

There is no real Polish history earlier than the reign of Mieszko, who was forced to pay tribute to the Emperor Otho in 963, and two years afterwards became a Christian and with the help of St. Adalbert induced his subjects to



accept the same faith. In 1225 Conrad, Duke of Masovia and brother of King Leszek I. (1194-1227), called the Teutonic Knights to Poland to assist in the conquest of the Prussians, but the knights soon became as formidable enemies of Poland as the Prussians had been. In 1240 the Mongols invaded the country, and defeated the Poles (1241) at Liegnitz, Silesia. In 1466, after 12 years of war, a treaty was signed at Thorn between Casimir and the Teutonic Knights, whereby West Prussia, including Pomerania and the cities of Danzig and Thorn belonged to Casimir; while East Prussia was left to the Teutonic Knights, who held it as a fief of the crown.

In 1772 the first partition was effected. Russia took White Russia and all the part beyond the Dnieper. Prussia took the palatinates of Marienburg, Pomorska, Warmia, Kulm (except Danzig and Thorn) and a part of Great Poland. Austria had Red Russia or Galicia, with parts of Podolia and Little Poland. In 1788 a remarkable Diet was opened, which lasted for four years, and at which the condition of the burghers and peasants was improved, the *liberum veto* finally suppressed, and the throne declared hereditary. But the external enemies of Poland—the Prussians, the Russians, and the Austrians—had resolved upon her destruction, and foreign troops were poured into the country. The second division of the country now took place. Prussia acquired the remainder of Great Poland, and the Russian boundary was advanced to the center of Lithuania and Volhynia. Kosciuszko, the Polish general, marched upon Warsaw, and compelled the Russians to raise (1794) the siege; the Poles executed many of the chief traitors of Grodno, but Warsaw was finally taken by Suvorov (1794). Stanislaus, on April 25, 1795, resigned the crown at Grodno, and the final partition of the country took place. Austria received Craców, with the country between the Pilica, the Vistula, and the Bug; Prussia had the capital, with the territory as far as the Niemen; and the rest went to Russia. Stanislaus died at St. Petersburg in 1798. A fresh settlement was made by the Congress of Vienna (1815). Austria was to have Galicia and the salt-mines of Wieliczka; Posen was to belong to Prussia. Craców was to form an independent state under the protection of the three powers, but was eventually incorporated with Austria in 1848. The remainder of the former kingdom of Poland was to constitute a constitutional monarchy under the Tsar. This constitution was, however, withdrawn after the great revolt of 1830, and in 1846 an-

other effort to reunite the dismembered Polish nation was easily suppressed by the three powers.

Outbreaks occurred in Russian Poland in 1861 and 1862; in 1863 a general insurrection was suppressed, and in the ensuing years various measures were taken for the Russification of the country. Immediately after the outbreak of the Great War of Europe the Grand Duke Nicholas, commander-in-chief of the Russian Army, issued an appeal for loyalty to the Polish people (Aug. 15, 1914). German and Austrian troops entered Russian Poland, and on Nov. 5, 1916, Germany and Austria issued a manifesto erecting the conquered territory of Warsaw and Lublin into a new kingdom of Poland, and declaring its right to an independent national existence and to government by its own chosen representatives. The real control of affairs, however, was retained by the Germans. A Council of State was created (January, 1917), and this was succeeded (September, 1917) by a Regency Council representing the more conservative Polish element. A Coalition Cabinet headed by Ignace Paderewski was formed in January, 1919; a constituent assembly was convened in Warsaw on February 10, 1919, and 10 days later General Pilsudski was confirmed by the Assembly in his powers as chief of the state pending the adoption of a constitution. The provisional government received Allied recognition Feb. 21, 1919.

By the terms of the Peace Treaty signed by Polish delegates and ratified by the Polish diet (July 31, 1919), Germany ceded to Poland nearly all of the Province of Posen and nearly all of West Prussia west of the Vistula, plebiscites to determine the disposition of the part of West Prussia east of the Vistula and south of its junction with the Nogat, of the southern two-fifths of East Prussia, and of most of Upper Silesia. Danzig was the adjacent territory west of the Nogat, was made a free city. Upon the basis of the plebiscite results in October, 1921, the League of Nations assigned to Poland the southern part of Upper Silesia, including the districts of Katowice, Królewska Huta, Rybnik and Pszczyna and also parts of the districts of Tarnowskie Góry and Lubliniec. The fixing of the eastern frontiers of Poland was by far more romantic. These frontiers were not the result of judicial awards and of round table conferences but of a long and heroic war.

By the end of 1919 the Bolsheviks finally crushed their internal enemies, and concentrated all their forces on the Polish front, with the

aim of destroying Poland. In August, 1920, when but 10 miles from Warsaw the Bolshevik armies were crushed, losing almost all of their ammunition and several hundred thousand prisoners. According to the peace treaty Russia recognized the independence of Poland and an almost straight line going from Latvia, in the North, to Roumania, in the South, was recognized as the boundary between the two countries. Wilno, Grodno, Pinsk, and Lück remained on the Polish side, Minsk on the Russian. Then followed the controversy between Poland and Lithuania over possession of Wilno. Its seizure by the Poles in 1920 was assented to by the Council of Ambassadors in 1923 but Lithuania remained dissatisfied. In 1926 Poland obtained a semi-permanent seat in the Council of the League of Nations; she was a partner in the Locarno Agreement and an original signer of the Kellogg Pact. She signed arbitration treaties with 23 nations and became a member of the World Court. In 1926 Marshal Pilsudski with army aid overturned the government and thenceforth until his death in 1935, exercised dictatorial powers over the government. Non-aggression pacts were made, in 1932 with Russia and in 1934 with Germany. In 1935 a new Constitution was adopted, and thereafter the government functioned in parliamentary form. Growing out of the Munich Pact, Poland received about 400 square miles from Czechoslovakia in 1938. After Hitler's successes in acquiring for Germany, all of Austria 1938, most of Czechoslovakia 1938-39 and Memel 1939, he directed his attention to Poland and the free city of Danzig, which was included within the Polish customs jurisdiction. Hitler's agents fomented strife in Danzig and among German minorities elsewhere under Polish rule, following which there were exchanges leading up to German demands upon Poland which included relinquishment to Germany of all Polish rights in Danzig and certain rights in the Polish Corridor. Aroused by the continuing spread of German aggressions, Great Britain and France supported Poland in her refusal of the demands. On September 1, 1939, the German armies advanced against Poland and met with but little effective resistance because of Poland's lack of modern military mechanization. Great Britain and France promptly declared war on Germany but could not reach Poland with military aid. Taking advantage of Poland's helplessness, Russia moved her armies into eastern Poland. Thus beset on both

sides, Poland was partitioned for the fourth time. Warsaw suffered destruction from German artillery and air bombs. The section awarded the U. S. S. R. was occupied by the Germans in 1941, after Germany attacked Russia, and was retaken by the Russians in 1943.

**Poland: Language and Literature.**—

The Polish language is one of the most widely spread branches of the Slavonic family, forming, with Bohemian and Sorbish or Lusatian Wendish, the western branch of the Slavic tongues. Among the very oldest literary monuments is a hymn to the Virgin Mary, ascribed to St. Adalbert. The period between 1541 and 1606 is called by the Poles the golden age of their literature. The list of poets begins with Nicholas Rej of Naglowice (1505-69). Jan Kochanowski (1530-84) is called the prince of Polish poets; he wrote a play entitled *The Settling Out of the Greek Ambassadors*, and some other lengthy works. Especially famous are his Lamentations (*Treny*) on the death of his daughter Ursula. Polish pastorals were written by Szymonowicz (1557-1629), called in Latin Simonides, and the brothers Zimorowicz, who were of Armenian descent. Somewhat later Jan Gawinski successfully cultivated this field of poetry.

The period from 1606 to 1764 has been styled by some writer *macaronic*, owing to the great number of Latin words introduced. The poetry certainly lacks originality; but we must except *Wojna Chocimska*, or the *Wars of the Chocim*, by Wacław Potocki (1622-96). The romantic movement reached Poland at the period of its political agonies. Adam Mickiewicz (1798-1855), is the greatest of all Polish poets. He is one of the glorious trio, of which Slowacki (1809-49) and Krasinski (1812-59) constitute the other two. The so-called Ukraine school produced the poets Zaleski, Malczewski (1793-1826), and others. The *Marya* of Malczewski is one of the most popular poems in the Polish language. An extraordinary fertile writer was Karłowicz (1812-87). No Polish writer of his period can compare with him in volume of output or breadth of range. The dominating figure of the last quarter of the past century is Henry Sienkiewicz (1846-1916) whose historical romances have a world wide following and whose short stories attracted general attention. His *Trilogy*, *Quo Vadis*, *The Knights of the Cross*, *Or the Field of Glory* and *The Legions* mark him one of Poland's greatest writers. Naturalism

and Nationalism in Polish life find their advocates in L. L. Reymont (1868-1925), whose novel *The Peasants* presents a panorama of Polish life, and for which he was awarded the Nobel Prize for Literature in 1924. Alexander Fredro has had no equal as a writer of Polish comedy. Consult Chmielewski's *History of Polish Literature* (6 vols.) ; Tarnowski's *History of Polish Literature*; Dyboski's *Periods of Polish Literary History* (1923) and *Modern Polish Literature* (1924).

**Poland Springs**, a well known resort in Androscoggin co., Maine, 23 m. n.w. of Portland. The waters of the springs, which are said to be highly beneficial, are widely used.

**Polaris**. The star nearest the North Pole.

**Polarity**, the property of having poles—that is, ends having certain opposite qualities.

**Polarization of Light**, in its simpler aspects, is closely associated with the phenomenon of double refraction. A ray of ordinary white light, either from the sun or from an artificial source, when passed through a crystal of Iceland spar is separated into two rays of practically equal intensities. These are called the ordinary and extraordinary rays. Let the two rays be received on the surface of a plate of glass (not a mirror) held at a fairly high obliquity to the ray so as to reflect it through an angle greater than a right angle. It will be found that for most positions of the reflecting plate the two rays will be after reflection markedly different as regards brightness. Another variation of the same experiment is to reflect the single ray first, and then pass it through the doubly refracting crystal, when in general the two rays will be of different intensity. Thus we learn that the two doubly refracted rays have what Newton called 'sides'; and it is this sidedness, or laterality, which is known as polarization.

The true significance of the phenomenon is best understood by expressing it in terms of the generally accepted theory, that light is a wave motion consisting of vibrations at right angles to the direction of the ray. In common unpolarized light the vibrations take place in all possible planes containing the ray, the sole condition being that they are perpendicular to it. When the light is passed through the doubly refracting crystal, every vibration is decomposed into two components at right angles to one another, the exact directions of which depend upon the position of the Iceland spar. This possibility of the separation of the ordinary ray from the extraordinary permits the use of the polarized beam in mineralogy studies, where the quality and property of sub-

stances may be thus analyzed, and also in the study of the structure of the atom where the spectral lines, when split in a magnetic field, will prove to be polarized in different ways. It is not possible to enter upon a description of the beautiful phenomena of polarization produced by means of uniaxial and biaxial crystals when placed in a beam of diverging or converging light. It remains to point out that polarization effects are not confined to luminous rays, but can be observed with the infra-red and ultra-violet rays.

**Pole, Reginald** (1500-58), English cardinal and Archbishop of Canterbury, was born in Stourton Castle, Staffordshire. In 1521-7 he was in Padua and later in Paris at the order of Henry VIII. to collect information regarding the king's divorce. On his marriage with Anne Boleyn (1533) Henry wrote to Pole (1534), asking for a definite avowal of his opinions on the divorce and on papal supremacy, and Pole replied with his treatise *Pro Ecclesiasticæ Unitatis Defensione*. The king promptly cancelled his preferments; but Paul III. appointed him cardinal (1536) and papal legate to England (1537). Pole's mother and relatives were arrested and executed, and an act of attainder was passed against Pole himself. On Henry's death (1547) Pole unsuccessfully tried to reclaim England from schism. It was not till after Mary's marriage with Philip of Spain (1554) that Parliament reversed his attainder, and Pole landed in England. He was then created Archbishop of Canterbury (1556).

**Polecat**, a European carnivore belonging to the weasel family. The ferret is a domesticated variety. A closely related animal is the North American skunk.

**Polenta**, an Italian dish, the chief ingredients of which are maize meal and salt.

**Poles**, the two terminal points of the earth's axis.

**Police**. Originally the word police meant all government, but it has finally come to be applied to that function of government which attempts to prevent the happening of evil and to promote the welfare of the people by means of restraint and compulsion, with the object of obtaining the greatest good to the greatest number. In England, prior to 1829, the protection of the people was entrusted to watchmen. At length through the efforts of Sir Robert Peel (from whose name are derived the familiar British terms, 'bobby' and 'peeler') an act was passed (1829) which provided a trained corps of policemen for the area of the Metropolis of London, with a systematic day and night patrol.

Early police conditions in the United States were similar to those existing in England. Watchmen and constables were the sole reliances for peace and protection. This system proved unsatisfactory, and in 1840 an attempt was made in New York City to reform the police system, which resulted eventually in establishing a force modelled on the Metropolitan Police of London. Philadelphia reorganized her police force on the English model in 1850, and the example of these two cities has been followed so generally that almost every

ers. There are also numerous bureaus, which include squads on automobiles, pawnshops, vice, homicide, health, narcotics; also an air squad, and four entirely new squads added to the force in 1931: alien, radical, bond and midtown jewel,—all operating in civilian clothes. There are over nineteen thousand policemen on the force and police expenditures exceed \$60,000,000 per annum.

Rural police protection in the United States is exceedingly inadequate. The first attempt to establish a distinctly State police seems to



*Mounted Police, New York City.*

city in the United States has an organized police force uniformed and professional in character. In American cities the police force is organized either under a single head known as a commissioner or superintendent, or under a board or committee, usually bi-partisan. Under the superintendent or board are the chief of police, captains, lieutenants, sergeants, roundsmen, and patrolmen. In the larger cities a separate detective bureau and a criminal identification bureau, called the rogues' gallery, are maintained; there are also sanitary squads, traffic squads, mounted police, bicycle squads, and policewomen.

In New York City the police force is organized under a Police Commissioner, appointed by the Mayor for 5 years; under him, and appointed by him, are six deputy commission-

ers. There have been made in Massachusetts in 1865, when a small force of State constables was appointed mainly to enforce the law in regard to the liquor traffic. The Pennsylvania State Police, consisting of four troops with a numerical strength of 330 men and officers, was organized in December, 1905; these men have all the powers of a municipal police as well as being fire, fish, game, and forestry wardens. In 1917 a New York State police was established with an organization founded on that of the Royal Northwest Mounted Police of Canada and the State Constabulary of Pennsylvania. The Texas rangers, organized in 1901, the Arizona rangers, in 1903, and the New Mexico mounted police, in 1905, are appointed by the governors of the respective States and do valiant duty in protecting the Mexican border.

*The Royal Northwest Mounted Police of Canada* occupy a unique position among the police forces of the world. This picturesque and efficient body of men came into existence as the result of lawless conditions in the Canadian Northwest. In 1873 an act was passed respecting the administration of justice and the establishment of a police force in the Northwest Territories. By October, 1873, the first 150 mounted policemen had been enrolled and despatched to temporary headquarters at Lower Fort Garry, Manitoba. This number was quickly augmented. The expedition westward was begun June 10, 1874. The number of men has been increased from time to time, the work has been extended, and additional posts have been established. The Mounted Po-

al law to designate the general inherent power vested in the several States of the United States to prescribe such rules for the conduct of their citizens, and such regulations regarding the use of private property as are necessary and desirable for the general welfare of the public. A certain amount of police power is usually delegated by the State to cities, and is exercised by them through municipal ordinances. Thus, a city may prescribe the kind of building materials which must be used within its limits as a protection against fire; whereas, no restrictions may exist in other cities or country districts in the same State. Perhaps the most frequent examples of the exercise of the police power are in regulations for public health, protection of streams from pollution,



*Target Practice, New York City Police.*

lice rendered valuable service during the construction of the Canadian Pacific Railroad, preventing liquor selling, gambling, thieving, and strikes among the men; and maintained order during the rush of immigration following the discovery of gold in the Yukon Territory (1894). During the Great War a force composed largely of ex-members, over 200 in number, carried out an effective control of the international boundary. At the present time the Royal Northwest Mounted Police are engaged chiefly in the Northwest Territories and the Yukon Territory. Enlistment is for 5 years; men must be between 22 and 40 years of age, sound in body and mind, and of exemplary character.

**Police Courts**, courts of limited jurisdiction for the disposition of petty criminal cases, usually only misdemeanors. A person charged with felony may be arraigned in such a court, and if there is any evidence tending to sustain the charge, the court may order him committed to await the action of the grand jury, or the county prosecuting attorney.

**Police Power**, a term used in constitution-

pure food laws, isolation of contagious diseases, etc. Fire regulations, provisions for safety in buildings, regulations tending to preserve and protect public morals, licensing certain trades and occupations, the direction of highway traffic, all fall within the police power.

**Polish Catholic Church** (Independent Catholic Church in the United States), an organization formed in Chicago, devoted to the churchly care of Polish immigrants estranged from the Roman Catholic Church and in danger of lapsing into infidelity. The founder is Father Anthony Kozlowski, who, the better to carry on the work, obtained consecration from the Old Catholics of Europe.

**Political and Social Science, American Academy of.** A body founded in Philadelphia in 1889, and incorporated in 1891. Its object is to keep its members in close touch with the practical social questions of the time and to be for them a sort of clearing house to collect and make available information on these questions.

**Political Offences.** Extradition trea-

ties, or the conventions by which nations regulate the handing over to each other of fugitive offenders found within their territory, practically always contain an exception with respect to 'offences of a political character.' It is not difficult to describe such offences generally as offences of a public nature against the existing government or constitution of the country in which they are committed.

**Polk, Frank Lyon** (1871-1943), American public official, was born in New York City. Following legal practice, he was counselor to the State Department at Washington, then Under-Secretary of State (1915-1918), and Acting Secretary of State (1918-1919). He was Commissioner of the United States for the peace negotiations following the Great War, and headed the American delegation to the Peace Conference, July-December, 1919.

**Polk, James Knox** (1795-1849), 11th President of the United States, born in Mecklenburg co., N. C., on Nov. 2, 1795. He was admitted to the bar in 1820; began practice at Columbia, Tenn., and in 1823 was elected to the legislature as a Democrat. He was elected to the Federal House of Representatives, and served from 1825 until 1839. He proved himself an able debater; was frequently the spokesman of the Jackson administration; became chairman of the Committee of Ways and Means; and in 1835 and again in 1837 was chosen speaker. In 1839 he became governor of Tennessee. In 1844, when President Tyler's term was drawing to a close, he was favorably regarded as a candidate for the Vice-Presidential nomination. The annexation of Texas was now the great political question before the country, and Polk expressed himself in favor of the step—'reannexation,' he called it—in no uncertain terms. The attitude of Van Buren, whose renomination to the Presidency had seemed at one time assured, was not satisfactory to the South. In consequence, when the convention met at Baltimore, he was unable to secure the necessary two-thirds majority, and the outcome was that the convention finally selected Polk for the Presidency. The campaign that followed was a closely contested one; but Polk was elected by 170 electoral votes against 105 for Clay.

The chief measures of his administration were the settlement of the Oregon boundary question, and the Mexican War. One of the cries in the campaign of 1844 had been 'Fifty-four-forty (54° 40') or fight!' But when the Polk administration was in office a compromise was agreed upon by which the paral-

lel of 49 degrees N. latitude was taken as the boundary line between the possessions of the United States and Great Britain in the disputed region. The trouble with Mexico over the annexation of Texas led to the Mexican War which resulted in the cession to the United States of California and a great area of other territory. (See MEXICAN WAR.) The acquisition of this vast territory precipitated a violent controversy over the question of the extension of slavery, which was not settled when Polk retired from office. (See WILMOT PROVISIO; COMPROMISE MEASURES OF 1850.)

**Polka**, a round dance said to have originated in 1830 or 1834 in Bohemia. The music is written in two-four time, the tempo being that of a military march played rather slowly. For a number of years it enjoyed remarkable popularity.

**Pollack**, a genus of the cod family, found in the North Atlantic. The only species (*Pollachius virens*), known as pollack, coal fish, or green cod, is about three ft. long, weighs about 25 pounds, and is distinguished by its greenish-brown color and its projecting jaw.

**Pollanarua**, buried city, the ancient capital of Ceylon, 52 miles northeast of Kandy, on an artificial lake called Topare or Topavewa, built in 368 A.D. In 769 the city became the official capital. Among the buildings uncovered by excavations are the Wata-du-Ge, a twelfth-century circular shrine, said to be the most beautiful building in Ceylon.

**Pollen**, the male element of flowering plants (angiosperms) and certain kinds of trees and shrubs (gymnosperms) which, in combination with the ovule, produces seed. Where pollination is accomplished by means of insects, as in most flowers, the pollen is adhesive and often has projecting points, or is otherwise adapted in shape to cling to the insect that carries it. In wind-fertilized plants, on the other hand, the pollen grains are smooth and round, so as to offer the least resistance to the atmosphere. See FLOWER.

**Pollination**, in botany, is the supply of the fertilizing pollen to the stigma of a flower. The natural means of transportation are the wind and insects, innumerable adaptations and methods being concerned. Pollination is also done artificially, to insure fruit, as in vanilla cultivation; or to cross various species, as in horticulture.

**Pollock, Sir Frederick** (1845-1937), Corpus professor of jurisprudence at Oxford (1883-1903), and professor of common law in the Inns of Court (1884-90). In 1911 he

delivered a course of lectures at Columbia University, New York, under the title 'The Genius of the Common Law.'

**Pollock, Channing** (1880- ), American author and dramatist, was born in Washington, D. C. From 1898 to 1900 he wrote dramatic criticisms for Washington papers, from 1900 to 1906 acted as a general press representative for different producers, and from 1905 to 1919 was dramatic critic for the *Smart Set* and the *Green Book*. He dramatized *The Pit* (1900); *The Traitor* (1908); *The Inner Shrine* (1909). His original plays include: *A Game of Hearts* (1903); *The Great Adventurer* (1905); *The Beauty Shop* (1913); *A Perfect Lady* (1914); *The Crowded Hour* (1918); *Roads of Destiny* (1918); *The Fool* (1922); *The Enemy* (1925); and *Mr. Moneypenny* (1928). He collaborated in the production of numerous musical comedies and has written *Stage Stories* (1899), *Behold the Man* (1901), *The Footlights—Fore and Aft* (1911); *Synthetic Gentleman* (1934).

**Poll Tax**, a tax levied on persons, so much per head. It was levied on strangers resident in ancient Athens and on certain undesirable members of the community. In England a poll tax levied in the reign of Richard II. gave rise (1381) to the insurrection of Wat Tyler. This form of taxation is employed in about half the States of the United States as an adjunct to the general property tax, or as a qualification for voting.

**Pollux**— $\beta$  Geminorum, a solar star of 1.2 magnitude, marking the head of the more easterly of the Heavenly Twins. It is fifty-one light years distant, is sixty-three times more luminous than the sun, and travels with a tangential speed of  $28\frac{1}{2}$  miles a second.

**Polo**, a game played with a small wooden ball and long flexible mallets, the players being mounted on ponies. It is played on a level field 900 by 450 ft., with goal posts at each end. The players on each side, usually four in number, mounted on specially trained ponies and provided with wooden mallets, line up opposite each other in the center of the field. The object of the game, as in football, hockey, and similar games, is to send the ball across the enemy's goal line. The duties of the players are as follows: The 'back,' or No. 4, is to hit the ball well up into the game, to make long shots at the goal, and, when opportunity occurs, to make runs. His chief occupation is freeing himself from the close attention he will receive from No. 1 of the opposing team. The duties of No. 3 are to prevent his back from being hustled,

to hustle the enemy's No. 2, and to hold himself in readiness to take the back's place when he is making a run. No. 2 should be the most active and most aggressive player, the fastest and most accurate hitting man on the team, acting entirely on the defensive. No. 1 is placed so as to worry his opponents, and in this he is materially aided by his privilege of playing offside.

The game of polo seems to date back as far as 600 B.C. and to be of Persian origin. It traveled from Persia to Turkey, and also to Tibet, Kashmir, and Bengal, where it became the chief sport of the English residents and planters. The game, at first called 'hockey on horseback,' was brought to England by the officers of the Tenth Hussars in 1869. Seven years later it was introduced into America. In 1886 a cup was presented to English and American polo players by the Westchester Polo Club of Newport, R. I. Since that time international matches have been frequent.

**Polo, Marco** (1254-1323), Italian traveler, was born in Venice. His father, Nicolo, and his uncle, Maffeo, were merchants who had traveled in the East and been received by Kublai, the great Mongol khan of Cathay (China). In 1271 they undertook another journey, taking young Marco with them. By the spring of 1275 they were again at the court of Kublai, who appointed Marco to a governorship. The party remained in the East till 1292, and in 1295 once more reached Venice. In 1298 Marco commanded a vessel in the war against Genoa and was captured by the enemy in a sea fight. During his captivity he dictated the account of his travels (in French) to a fellow prisoner, Rusticiano or Rustichello of Pisa. He was released in 1299, became a member of the Grand Council of Venice, and died there. Polo tells graphically of the geography, peoples, ethnography, manners, and customs of various parts of Asia as he himself observed them. Consult the admirable *Book of Sir Marco Polo* edited by Sir Henry Yule.

**Polonaise**, a Polish national dance, of slow movement in three-quarter time, made up of a march or promenade. The name is applied also to the music for such a dance which is written in a peculiar rhythm used by many composers, but especially elaborated by Chopin.

**Polonium** (Po), a metallic element occurring in pitchblende, and resembling bismuth in its properties, discovered by Mme. Curie in 1898. The activity of the metal is 1-1000 part of the initial in five years' time. It ap-

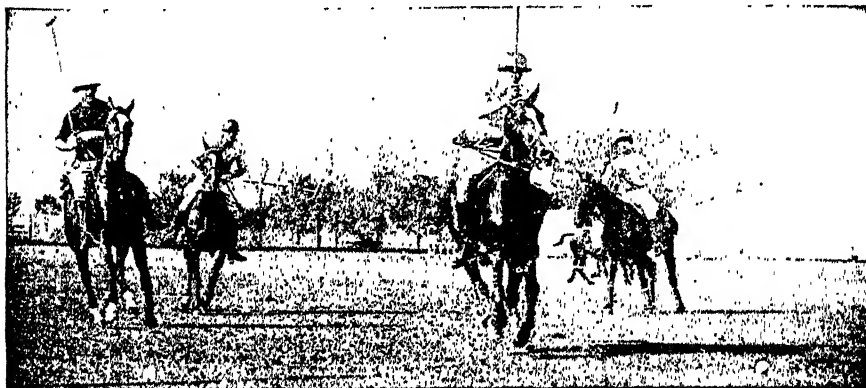
pears that its decomposition product is not radioactive. Polonium gives off  $\alpha$  particles, which are readily absorbed by certain metals. The  $\alpha$  rays from polonium have greater value than the  $\alpha$  rays of radium, being very penetrating. See RADIUM; RADIOACTIVITY.

**Polotsk**, manufacturing town, Russia, on a branch of the Dwina. Features of interest are the old palace buildings in the Kremlin, the Cathedral of St. Nicholas, and the Spasskii convent (famous for conflicts of July-October, 1812); p. about 32,000.

**Poltava**, a former government of Ukraine, bounded on the w. by Kiev and on the e. by Kharkov, with an area of 19,365 sq. miles. The general aspect is that of a wide plain,

erty of a people. Food is so scarce that none but effective males can be reared, and woman is a luxury. In Polyandry kinship is reckoned on the female side alone.

**Polybius** (c. 201-122 B.C.), Greek historian, was a native of Megalopolis in Arcadia, and became one of the chief statesmen of the Achæan League. He was in 167 B.C. one of a thousand Achæan hostages who were taken to Italy. This brought him into the society of the younger Scipio Africanus and Lælius. In 150 Polybius returned to the Peloponnesus, and did his best to prevent his countrymen from embarking in the war against Rome, which caused Greece to lose its independence in 146. He spent the rest of his life in literary



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Polo Match.

sloping gradually from northeast to southwest, with the Dnieper flowing along the entire southwestern border. The climate is temperate, and most of the soil belongs to the fertile black earth zone. The chief occupations are agriculture and stock-raising; p. 3,750,000.

**Poltava**, city, Ukraine, Soviet Russia. A monument known as the Swedish tomb commemorates the victory of Russia over Sweden, July 9, 1709. Important fairs are held yearly in July. There is an extensive trade in cattle, grain, and meat. The town was occupied by German forces in March, 1918, following the treaty of Brest-Litovsk. It was the scene of fighting between the White Russians and the Bolsheviks; p. 92,000.

**Polyandry**, a social arrangement whereby one woman is married to several husbands. It is a more primitive institution than polygamy, where one man is married to several wives. Polyandry is an indication of the pov-

pursuits and in travel. His universal history covers the period from 220 to 146 B.C. Only the first five books exist entire, though there are many fragments, some considerable, of the rest. Polybius's great merit as a historian is his thoroughness and his impartiality.

**Polycarp**, one of the apostolic fathers, bishop of Smyrna, was born c. 70 A.D. He labored in Asia Minor, received a visit and an epistle from Ignatius, made a journey to Rome, and shortly after his return to Smyrna was martyred. Polycarp is said (by his pupil Irenæus) to have known and spoken with John and the other disciples; and this fact, as well as his gift of preaching and his devout character, gave him a position of great authority among the Asian churches. *The Epistle to the Philippians*, his only extant work, contains numerous references to the New Testament.

**Polyclitus**, Greek sculptor, was born probably about 480 B.C., and lived until about



410. He was a fellow-pupil with Myron and Phidias. It was in the treatment of the human figure that Polyclitus was supreme. His imagination and technical skill were his greatest qualities. His most famous statue was the *Doryphorus* or spear-bearer. Another famous work was the *Diadumenos*, an athlete binding a fillet around his head. Polyclitus worked chiefly in bronze; and as an architect designed the theatre at Epidaurus, which still exists.

**Polygala**, a natural order of plants, usually with milky juice, especially in their roots. The gay little flowers are perfect but irregular, having two lateral sepals, wing-like, larger than the other three, and colored. The largest and handsomest species is the 'fringed milkwort' (*P. paucifolia*), found in woodlands. One of the commonest polygalas in dry soil is the purple-tinged (*P. verticillata*), a delicate plant with linear leaves in whorls.

**Polygamy**, the social arrangement whereby a man is married to two or more wives. It is still the marriage form in Africa universally, in Asia, and partly in Australia and Polynesia. Judaism in Old Testament times tolerated and recognized it. Mohammedanism has permitted a man to have as many as four wives. Neither in Greece, nor in Rome, nor among the Germans was polygamy practised. Polygamy in Christian countries is generally regarded as a criminal offence: in the United States and British countries it is called bigamy, and is punishable by imprisonment.

**Polyglot**, a work containing the original and various translations of a book, usually the Bible, the several languages being placed in parallel columns on a single or double page.

**Polygon**, a closed figure bounded by straight lines, and therefore with as many angles as sides. The triangle is the simplest polygon, and lies wholly in one plane. Ordinarily the term is applied to figures which have more than four sides.

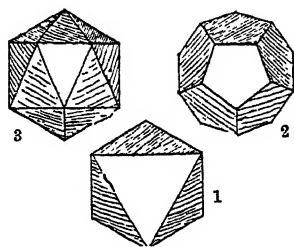
**Polygonaceæ**, a natural order of herbaceous plants, bearing spikes or panicles of small flowers, often unisexual. Among the common species are buckwheat (*Polygonum fagopyrum*); the common knot grass (*P. aviculare*); *P. convolvulus*, the climbing perispermia, as well as the various docks and sorrels.

**Polygonatum**, a genus of plants belonging to the order Liliaceæ, characterized by the flowers having six-cleft corollas, and by the fruits being berries. There are two similar species, called 'Solomon's seal' in eastern Am-

erica, having slender arching stems, with many broad leaves, and two or more bell-shaped, greenish flowers depending from the axils. These are succeeded by blue berries, with a bloom.

**Polygonum**. A genus of the buckwheat family including many of our common weeds and several cultivated plants. The flowers are small, generally perfect, white, green, or rose-colored, in various clusters.

**Polyhedron**, a finite portion of space bounded on all sides by planes. The plane figures which bound it are called 'faces'; the sides of these faces, 'edges'; and the points where the edges meet, 'corners,' or vertices. A regular polyhedron is one in which all the



*Polyhedra.*

1, Octahedron; 2, Dodecahedron; 3, Icosahedron.

faces are equal regular figures, in which case at least three faces must meet to form a vertex; the maximum plane angle must be that of a pentagon, since the three angles of a hexagon cannot form a solid angle.

**Polynesia**, in the wider sense, is synonymous with the South Sea islands. But the expression is now usually confined to the e. section, which is, roughly, limited westwards by a line drawn from New Zealand through Samoa to Hawaii, and extends eastwards to Easter I. in 110° w., about 2,400 miles from S. America. The Kanakas, as the natives of this insular world call themselves, belong undoubtedly to one primitive stock, which differs essentially from both the Papuan and the Malayan. The physical type is everywhere marked by regular, almost European features, tall stature (averaging about 5 ft. 10 in.), straight and very black hair, and generally light brown complexion. Their speech is a distinct branch of the Malayo-Polynesian stock language. Their mental characters, their traditions, mythologies, industrial arts, and usages are everywhere almost identical. The Polynesians have steadily decreased in numbers ever since their first contact with Eu-

ropeans. The Tahitians, who in Cook's time mustered 68,000 warriors, are now reduced to about 15,000; the Maoris have fallen from perhaps 200,000 to 40,000; the Hawaiians from 300,000 (?) to less than 50,000; and all the Polynesians from certainly over 1,000,000 to about 150,000.

**Polyp**, a name applied to those Cœlenterata in which the body has the form of a tube, fixed at one end, and bearing a circle of tentacles round the other or free end. This form is well exemplified in the common freshwater polyp Hydra; but the name is equally applicable to the individual sea-anemones, and to the members of a colonial 'coral,' or other compound hydrozoan.

**Polyphemus**, in ancient Greek legend, one of the Cyclopes. He devoured some of the comrades of Odysseus, who visited his cave on their return from Troy. Odysseus presented him with some strong wine, and when he had fallen into a deep sleep, put out his eye with a burning pole, and escaped.

**Polyphemus Moth**, one of the large American silkworm moths (*Telea polyphemus*). See MORRIS.

**Polyphonic**, a musical term applied to a form of composition in which two or more distinct melodies of equal importance are used conjointly in such a manner that the union of their notes produces correct chordal combinations.

**Polypodium**, a genus of ferns, generally with sori on the back of the lobes. The species are very numerous. *P. vulgare* is a stiff fern found on rocks throughout the northern hemisphere.

**Polypterus**, a genus of fishes which contains but a single species, the bichir (*P. bichir*) of the Nile and other rivers of tropical Africa.

**Polypus**, in surgery, a tumor, frequently multiple, of various sizes, and with a narrow neck. The term is generally used for non-malignant growths on mucous membranes, found most commonly in the nose, where they may interfere with respiration. Polypi also occur in the uterus, mouth, rectum, and other places. Where they are of serious importance they should be removed.

**Polytechnic Institute of Brooklyn**. An institution in the borough of Brooklyn, New York City, developed from the Brooklyn Collegiate and Polytechnic Institute, founded in 1853. The curriculum, at first mainly preparatory for college and business pursuits, was enlarged until in 1870 it comprised two

courses of study leading to the bachelor's degree in art and science. In 1890 the institute was reorganized and received a college charter.

**Polytechnic Schools**, educational institutions in which instruction is afforded in numerous arts and sciences, more particularly with reference to their practical application. The first polytechnic school was the Ecole Polytechnique, founded by a decree of the French Convention in 1794. In Germany the most important industries have been created by means of the education afforded in these schools. In France technical education has been fostered by similar institutions. In America, among the more important institutions are the Massachusetts Institute of Technology, Boston; Worcester Polytechnic Institute, Mass.; Rensselaer Polytechnic Institute at Troy, N. Y.; Stevens Institute at Hoboken, N. J.; Case School of Applied Science at Cleveland; Purdue University at Lafayette, Ind.; Rose Polytechnic Institute at Terre Haute, Ind.; Armour Institute of Technology at Chicago; Iowa State College of Agriculture and Mechanic Arts at Ames, and the Carnegie Institute at Pittsburgh. Several important polytechnic schools form departments of universities or colleges, such as the School of Mines, etc. (Columbia University, New York), Sheffield Scientific School (Yale), etc.

**Polytheism**, belief in a plurality of gods, is a stage in the development of the religious spirit. In a general sense it may include naturism and animism. The great nations of antiquity were generally polytheistic—Assyria, Babylonia, Egypt, Greece, and Rome, as well as India (Brahmanism), though the last mentioned shows an underlying pantheism. See RELIGION.

**Polyzoa**, or **Bryozoa**, a group of animals of somewhat obscure affinities. Almost all are colonial, and although the individuals are small, the colonies reach a considerable size. Among the more familiar forms are the scum-mats (*Elustora*), often abundant on the beach after storms, and taken for seaweed; the encrusting *Lepralia*, which forms a lacelike pattern on the fronds of weed; the gelatinous *Alcyonidium*. All these are marine, but there are also a considerable number of fresh-water forms. At one time the Polyzoa were classed with Hydrozoa, but they are in many respects much more complicated in structure.

**Pomaceæ**, a family of flowering plants near to the order Rosaceæ, which bear fruits

called pomes. The quince, hawthorn, apple, pear, and mountain ash are well-known examples.

**Pomace Fly**, a small yellowish fly of the genus *Drosophila*, several species of which abound about cider-mills and places where decaying fruit or fruit juice is stored.

**Pome**, a name given to a form of indehiscent fruit, in which the epicarp and mesocarp, together with the calyx, form a fleshy mass, the endocarp forming scaly-walled cells enclosing the seeds. The apple and pear are examples.

**Pomegranate** (*Punica granatum*), a small deciduous tree growing wild in Persia, Afghanistan, and adjacent countries. It has been cultivated from time immemorial. It was one of the fruit trees of the Promised



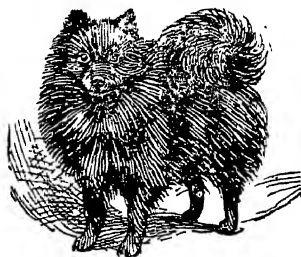
*Pomegranate.*

1, Fruit; 2, section of fruit.

Land, and in the *Odyssey* it is stated to occur in the gardens of Phæacia and Phrygia. The fruits have a tough, thick, bitter rind, of a reddish-yellow color. They are apple-shaped, with a crown of sepals, and are filled with seeds, each surrounded by acidulous, crimson pulp. The shrub itself is of considerable grace and beauty, enhanced by the scarlet flowers and golden fruits.

**Pomerania**, prov., Prussia, stretching along the Baltic, e. and w. of mouth of Oder and Stettiner Haff. It belongs to the N. German plain, but is traversed by the Baltic ridge, on which are numerous small lakes. Agriculture is the principal occupation. Poultry are raised and fish caught. Stettin is the capital. Area, 11,625 sq. miles; p. 1,878,781. Pomerania was Slav down to 1637. Most of Hither Pomerania and part of Farther Pomerania remained in Swedish hands from about 1630 down to 1720, and the remainder of the former down to 1815.

**Pomeranian Dog**, or **Spitz Dog**, a small bushy-haired, prick-eared, curly-tailed dog, of German origin, anciently of service as a hunting dog, but now only as a pet. It was originally of a pure white color, and weighed from 20 to 25 lbs.; but the specimens most valued now are the diminutive varieties that



*Pomeranian Dog.*

scale from 4 to 8 lbs., and are colored black, sable, and parti-colored. The breed became very popular in Great Britain in the latter part of the 19th century owing to the fact that it was a favorite of Queen Victoria.

**Pomo**, an Indian tribe of northwestern California speaking a distinct language known as the Kulanapan. They are divided into thirty bands, each living in a separate mountain valley. Their claim to fame is based upon skill in basketry, for among all the Indian basket-making tribes on the Pacific coast the Pomo rank first. They are proficient in every variety of basketry, twined or coiled, and know a few stitches that are peculiar to themselves.

**Pomona**, in ancient Roman mythology, the goddess of fruit-trees and fruits.

**Pomona**, city, Los Angeles co., Cal. Owing to its attractive site and beautiful surroundings, it is a well-known residential city and health resort. At Claremont, 4 miles distant, is situated Pomona College. The city is in a rich fruit and vegetable district, and has a large trade, especially in oranges, berries, and alfalfa, as well as in fruit canning and packing; p. 23,539.

**Pompadour**, **Jeanne Antoinette Poisson, Marquise de** (1721-64), mistress of Louis xv. of France, was born in Paris. The king met her at a *bal masqué* in 1745, was captivated, and established her at Versailles, and ennobled her in 1745. 'La Pompadour' became the center of a brilliant intellectual and artistic circle, including Voltaire, Quesnay, Boucher, and Greuze. Louis, a mere puppet, gave her tremendous power. She made and unmade ministers, diplomatists,

and generals. During the Seven Years' War France supported her hereditary enemy Austria, merely because Maria Theresa had written a courteous letter to the Marquise de Pompadour, while Frederick the Great composed scandalous verses about her.



Marquise de Pompadour.

**Pompano**, the name in the United States of several excellent fishes of the family Carangidae widely distributed along the coasts of the warmer parts of the world, everywhere regarded as of high quality both as game and for the table. The commonest and best known of the American species is the Floridan pompano (*T. carolinus*), which enters the bays and estuaries of all the South Atlantic and Gulf states to spawn in the spring, and then is esteemed one of the most delicate of all coast fishes; it is taken about southern Florida and the West Indies all the year, and is fattest and best there in the fall, when it again forms in large schools. It reaches a length of about 18 inches, and, like its congeners, is vertically flattened and ovate in form, and a beautiful silvery blue in color. The fish called 'pompano,' and highly valued in southern California, is in another class, being an ally of the harvest fishes.

**Pompeii**, a city of Campania, in ancient Italy, at southeast foot of Vesuvius. It certainly existed before 500 B.C.; about 400 B.C. the city was captured by the Samnites. About 300 B.C. Pompeii was brought into dependence on Rome; but in 90 B.C. it joined the Italian allies against Rome in the Social War, and in 89 it was unsuccessfully besieged by Sulla, who, however, in 80 settled there a colony of Roman veterans. The industries of the city were wine-making, fishing, the man-

ufacture of millstones of lava, and the working of pumice stone. In 63 A.D. a violent earthquake threw down many of the city buildings. On Aug. 24, 79 A.D., Vesuvius broke out in eruption, and by the evening of the 25th Pompeii was covered, all but the roofs of its houses. It has been estimated that about 2,000 persons perished.

The result of excavations has been to bring to light the forum and the buildings which surround it—namely, the temple of Jupiter, the basilica or town hall, the temple of Apollo, the *macellum* or provision market, the shrine of the city *lares*, the temple of Vespasian, the building of Eumachia—probably a bazaar for wearing apparel—the *comitium* or voting place, and the municipal offices; the temple of Fortuna Augusta; a large and a small theatre, with a colonnade adjoining; a wrestling-place, or *palastra*; three bathing establishments; and an amphitheatre. The private houses, of which many exist, throw light on ancient domestic life. Several of them contain a complete arrangement for the bath, with warm and hot chambers, heated by hot air, and swimming tanks. The walls were painted, usually in fresco, with ornamentations. Elegant columns and mosaic floors added to the beauty of the rooms. As many as 3,500 paintings have been recovered. The discovery of a set of auctioneer's receipts indicates clearly Latin methods.

**Pompeius**, **Gnaeus Pompeius Magnus** (106-48 B.C.), commonly known as Pompey the Great. When in 83 B.C. Sulla was about to land in Italy on his return from the East, Pompey raised three legions, and utterly defeated one of three Marian armies which surrounded him. In 77 Lepidus, who had tried during his year as consul to overthrow the constitution of Sulla, marched with an army on Rome; and Pompey had to defeat him. His next command was in Spain, against Sertorius, the last remaining leader of the Marian party. Pompey was in Spain from 76 to 71 B.C.

On his return Pompey's popularity gained him a triumph and the consulship for 70 B.C. In 67 an extraordinary command against the pirates who then infested the Mediterranean was given him, and in three months he cleared the sea of them. In 66 by another special law, that of Manilius, he was appointed to succeed Lucullus in Asia, retaining also the supreme command over all the Mediterranean and its coasts. In 66 he defeated Mithridates, and subdued Armenia; in 65 he reduced W. Pontus to a province, and in 64 did



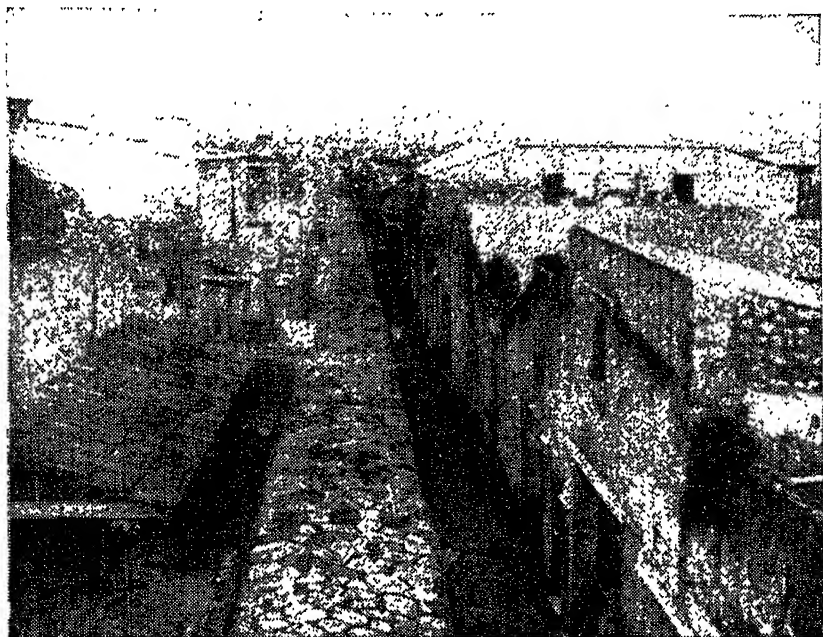
# ORIENTAL POPPY

There are many varieties of poppies, but this is the most common

the same with Syria. In 63 he captured Jerusalem, and entered the Holy of holies in the temple. He next joined with Cæsar and Crassus in the first triumvirate. As the result of this, Cæsar was consul for 59 B.C., and Pompey married Cæsar's daughter Julia. Through jealousy of Cæsar he became the head of the aristocratic party. Then followed the civil war between Pompey and Cæsar. After raising an army in the East, Pompey established himself in Epirus, near Dyrrachium. In 48 Cæsar followed him; and near Pharsalus was fought on August 9 the battle which decided the war in Cæsar's favor. Pompey es-

Plaza de las Delicias and the Plaza Principal. It is the most modern city of Porto Rico, being well built, with clean and wide streets, and having good water, public schools, library, theatres, asylums, and hospitals. There are also electric street railways and electric lights; p. 41,912.

**Ponce de Leon, Juan** (1460-1521), celebrated Spanish explorer, born in San Servas, Spain, according to some accounts accompanied Columbus on his second voyage; and in 1502 was a member of Nicolas de Ovando's expedition to Hispaniola. He became governor of part of the island; in 1508 led an



*Pompeii: Recent Excavations. Street of Abundance.*

caped to Egypt, but was murdered as he was landing. As a general Pompey was bold, rapid, and foreseeing in action; a wise administrator and governor; and personally a man of brave, upright, and just nature; but he was no statesman.

**Ponce**, the capital of the department of Ponce, Porto Rico, 50 miles southwest of San Juan. It is connected by an electric road with its port, Playa de Ponce, 3 miles distant. It is the second largest city of the island and the first in commercial importance, having a large export trade in coffee, sugar, rum, molasses, and tobacco. The two most prominent features are the squares known as the

expedition to Porto Rico; and in 1510 was made governor of the island, which he proceeded to conquer. Having been deprived of his position in 1512, he determined to go in search of a fountain of perpetual youth. With three ships he sailed northwest in March, 1513, and on March 27, Palm Sunday (*Pascua Florida*), sighted land. On April 8 he landed near the site of the present town of St. Augustine, and, taking possession, named the land 'Florida.' Returning to Spain, he secured an appointment as governor of the new region; and in 1521, after one abortive attempt in 1515, led an expedition to conquer the country. The attempt was un-

successful; Ponce de Leon failed to find the much desired fountain; many of his followers were killed by the Indians, and he himself was wounded by an arrow and died soon after in Cuba.

**Poncho**, a usually waterproof narrow blanket with an opening in the middle for the head, and hanging down loosely before and behind, affording freedom to the arms. It is used by the native Indians, as well as by the Spaniards of South America. Ponchos are usually made of india-rubber and are a part of the soldier's equipment.

**Pond, Frederick Eugene** (1856-1925), American editor and author, was born in Packwaukee, Wisconsin, and became interested in out-of-door sports at an early age. From 1881 to 1886 he was field editor of the *N. Y. Turf, Field, and Farm*, and during 1888-9 edited *Wildwood's Magazine*, the latter taking its name from Pond's pseudonym, 'Will Wildwood.' This periodical he merged with *Turf, Field, and Farm*, for which he became corresponding editor. In 1897 he became editor of the *Sportsman's Review*, and in 1917-8 was editor of the *American Angler*, after which he was editor of the Rod and Gun Department, *New York Herald*.

**Pond, James Burton** (1838-1903), American lecture manager, was born in Cuba, Alleghany co., N. Y. At the outbreak of the Civil War he enlisted. From 1865 to 1873 he followed mercantile pursuits in the West, and then purchased, with George Hathaway, Redpath's Lyceum Lecture Bureau in Boston. Three years afterwards he acquired full ownership, and in 1879 established the business in New York City as the American Lecture Bureau, which he managed until his death. Among those who lectured under his management were Henry Ward Beecher, Henry M. Stanley, Wendell Phillips, Emerson, Sumner, John B. Gough, Talmage, Anna Dickinson, Thomas Nast, Canon Kingsley, Matthew Arnold, Sir Edwin Arnold, Mark Twain, Max O'Rell, Conan Doyle, Anthony Hope, and George Kennan.

**Pondicherry**, chief settlement of the French in India, on the e. coast of Madras. It has an area of 115 sq. miles, and is divided into the White (European) town and the Black town, separated by a canal. Government House, a handsome building, is situated near the sea. Other buildings and institutions include the Cathedral, built in 1855, a Hôtel de Ville, a Colonial College, and several government schools. The chief industries

are weaving and spinning; p. district, 185,479; town, 47,678.

**Pond Lily**. See **Water Lily**.

**Pondoland**, district, in the eastern part of the Cape of Good Hope prov., South Africa, bordering on the Indian Ocean; area, 3,906 sq. miles. It was annexed to Cape Colony in 1894. St. John's, at the mouth of the river of the same name, is an excellent port.

**Poniatowski, Stanislas II** (1732-1798), last king of Poland as an independent kingdom, gave Poland a constitution.

**Poniatowski, Stanislas, Count** (1677-1762), Polish nobleman, father of Stanislas II., king of Poland; aided Charles XII. of Sweden against Russia. In 1733 he supported the unsuccessful attempt of Stanislas Leszczynski to gain the Polish throne.

**Pons, Lily** (1904- ), opera singer, was born in Cannes, France. She made her first appearance in New York, as *Lucia* with the Metropolitan Opera Co., Jan., 1931.

**Ponselle, Rosa Melba** (1895- ), American singer, was born in Meriden, Conn. She made her successful début at the Metropolitan Opera House in 1918, singing with Caruso, and continued in many parts with much popular favor, singing in London in May, 1929.

**Ponta Delgada**, largest town of the Azores, on the southern coast of São Miguel. A breakwater, 2,800 ft. long, protects the roadstead. Fruits and grain are shipped; p. 18,000.

**Pont-à-Mousson**, town, France, in the department of Meurthe-et-Moselle, on the Moselle. From 1572 to 1768 it was the seat of a university. It was heavily bombarded in September, 1914, and was within the American zone during the battle of St. Mihiel (September, 1918); p. 15,000.

**Pontchartrain, Lake**, a salt water lake in the southeastern part of Louisiana; about 5 m. n. of New Orleans, with which it is connected by two canals, which are navigable for schooners and terminate in basins in the city. It is about 40 m. long and 25 m. wide, and although it is shallow, generally from 12 to 14 ft. deep, it is used in the coasting trade with New Orleans, and is the channel of a considerable commerce. On the n. shore are located some of the suburbs of New Orleans.

**Pontevedra**, province, N.W. Spain, with an area of 1,695 sq. m. It has numerous deep bays forming excellent fishing grounds. The surface is extremely mountainous; the

slopes furnish pasturage for cattle and yield timber, and the valleys produce maize, grain, and vegetables: p. 573, 255.

**Pontevedra**, city, Spain, capital of the province of the same name, is situated at the head of a deep bay. It is a handsome, progressive city, of Roman origin (*Duo Pontes*), in the midst of the 'Spanish Switzerland.' Fishing, food preserving, and timber cutting are active industries; p. 22, 300.

**Pontiac**, city, Illinois, county seat of Livingston co., on the Vermillion River. The Illinois State Reformatory is located here. Pontiac is in the corn belt and the surrounding region is devoted to agriculture and stock-raising. There are several mills and iron foundries; p. 9, 585.

**Pontiac**, city, Michigan, county seat of Oakland co., 25 m. n.w. of Detroit, with which it is connected by electric roads and a concrete highway. It is in a region containing more than 400 picturesque small lakes on the shores of which are club-houses, summer residences, hotels, and the Michigan Military Academy. The Eastern Michigan Asylum for the Insane is the leading charitable institution. Wool and agricultural products are shipped from the city in large quantities. Within recent years the industrial development of Pontiac has been rapid. There are iron foundries, brick yards, bottling works, flour mills, and planing mills, and manufactures of automobiles, gas and gasoline engines, farm machinery, bicycles, and pumps. Pontiac was named after the famous Indian chief; p. 66, 626.

**Pontiac** (c. 1720-69), head chief of the Ottawa Indians, born between 1712 and 1720, probably on Maumee river, near the mouth of the Auglaize. Nothing is definitely known of Pontiac's early life, beyond the fact that by 1755 he had through the exercise of fierce courage, the arts of diplomacy and leadership, and uncommon skill as an organizer, become widely known and respected among the Algonquian tribes; and as principal chief of the Ottawa was at the head of the loose confederacy of the Ottawa, Chippewa, and Potawatomi, which with the Miami practically dominated the country n. and w. of the Ohio River. After the surrender of Montreal (Sept. 8, 1760) and the fall of New France, Pontiac visited the British commander, Maj. Robert Rogers who had been sent to take possession of French forts along the upper Great Lakes, and declared he was ready to allow the strangers to occupy his country so

long as 'they treated him with due respect and deference.'

Unlike the French, who generously treated the aborigines with all possible consideration, and even fraternized with them, the English were found by the latter to be harsh and tactless rulers, and Pontiac soon began the organization of a general native revolt, designed to destroy the newcomers. Pontiac's indignation reached its height in the spring of 1763, on learning that by the Treaty of Paris (Feb. 10) the French 'father' had ceded vast stretches of Indian lands to the English 'father' without the consent of the natives. Throughout that summer the English forts were besieged with a persistence rare among savages. As usual, the Indians in time wearied of their confederacy, and were cowed by repeated defeats at the hands of the English punitive expedition. In May, 1765, the French induced Pontiac, now deserted by most of his followers, to sue for English friendship; a year afterward, at Oswego, peace was formally arranged.

**Pontifex**, the title given at ancient Rome to the members of the college of priests. They were the supreme authorities in all religious matters, and were not attached to the service of any particular deities, but watched over the whole state religion. The college was said to have been founded by Numa. At the head of the college was the *pontifex maximus*, or chief pontiff, who held office for life. He was usually a man of high political standing—as Julius Cæsar. The office was always held by the emperor after the establishment of the empire; Theodosius was the first to relinquish it. In time it was assumed by the bishop of Rome, and is indeed the formal title of the Pope.

**Pontifical**, a Roman Catholic service book, which contains those offices of the church in which a bishop or a bishop's delegate alone is permitted to officiate. The *Pontificale Romanum*, compiled in 1485, contains offices for ordination, consecrations of places and people, episcopal benedictions, and receptions of the religious.

**Pontine Marshes**, marshy district, Italy, 25 m. s.e. of Rome. It is from 18 to 25 m. in length, and has a width of from 4½ to 5 m. Previous to the Roman occupation (358 B.C.) the district was carefully drained, and was studded with towns and villages. Subsequently the drainage works fell into decay, and nothing was done until Appius Claudius constructed the Via Appia through them in



312 B.C. In 1899 the Italian government set aside \$1,362,000 for drainage purposes, which is rapidly being accomplished.

**Pontius Pilatus**, or **Pontius Pilate**, the Roman governor who authorized the crucifixion of Jesus Christ, was procurator of Judæa probably from 26 to 36 A.D. He was deposed from his office by Vitellius, the governor of Syria, because of his severity. He returned to Rome to stand his trial just after the death of Tiberius (March, 37 A.D.). According to Eusebius, he committed suicide soon afterward.

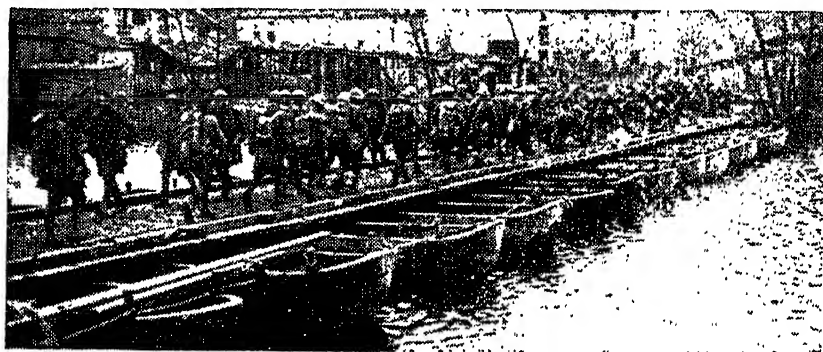
**Pontoons**, boats used in the construction of military bridges and which serve as floating piers or supports for the roadway. In the American Army the wooden pontoon, weighing 1600 pounds complete, is used in the heavy bridge trains.

chief importance under Mithridates VI., the Great, who carried on several wars with Rome. The only important town was Trapeus, afterwards Trebizond.

**Pontus Euxinus**, ancient name of the Black Sea.

**Pony**. See **Horse**.

**Pony Express**, a name given to a mail service between St. Joseph, Mo., and San Francisco, Calif., about 1,960 m. distant, established in the early part of 1860 to shorten the time required for letter transmission to and from the Pacific coast. Prior to that time most of this mail had been carried by way of Panama in about twenty-two days. The pony express reduced the time of transmission to about eight days. The route between St. Joseph and Sacramento was covered on horseback and from there to San



*Pontoon Bridge: U. S. troops crossing Rhine into Germany.*

**Pontoppidan, Henrik** (1857- ), Danish novelist, was born in Fredericia, and educated at the University of Copenhagen. He first excited attention by his *Stakkede Vinger* (1881). His later works are masterpieces of exact observation, written in a style not unlike that of George Eliot. The religious life of the country folk in Denmark is admirably described in his pages, not without a touch of humorous satire. In 1917 he received the Nobel prize in literature. His principal works are *Det forjættede Land* (1892; Eng. trans. *The Promised Land*, 1896); *Dommedagsdag* (1895); *Fortællinger* (1899); *Den gamle Adam* (1894); *Høisang* (1896); *Lykke Per* (1898-1900); *Det Ideale Hjem* (1900); *Lille Rødhætte* (1901); *De Dødes Rige* (1912-16); *Fausningholm* (1916); *Højsang* (1921).

**Pontus**, anciently a district of Asia Minor on the s.e. coast of the Euxine or Black Sea. In Pontus a native monarchy reached its

Francisco by fast steamer. The scheduled daily distance to be covered by each rider was 75 m. The stations, at first about 25 m. apart, were finally increased to 190 in number. In the beginning the postal rate was \$5.00 per half ounce, but subsequently it was reduced to \$1.00. The first trip was begun on April 3, 1860, and the service, which frequently suffered from the hostilities of the Indians, was discontinued in October of the following year, when transcontinental telegraphic communication was opened.

**Pood**, a Russian commercial weight, the sixty-third part of a ton. It contains 40 Russian lbs., and is ordinarily reckoned equal to 36 lbs. avoirdupois, but is actually 36 lbs. 1 oz. 13 drs.

**Poodle**, a dog popularly supposed to come from France, and sometimes therefore called the French poodle. It has a great capacity for learning and performing tricks. Like the bulldog, it varies greatly in size, ranging

from 20 lbs. to 60 lbs. in weight. The poodle is gifted with a keen sense of smell, will take readily to the water, and is remarkably intelligent and unsurpassed as a retriever. The head should be long, straight, and fine; the skull rather narrow and peaked at back; eyes almond-shaped, very dark brown, full of fire and intelligence; back short, strong, and slightly curved; legs well set, straight from the shoulders; tail set on rather high, never curled or carried on the back; coat profuse and of good hard texture—if corded, hanging in tight, even cords; if uncorded, thick and strong, of even length, and free from knots or cords. Colors should be black, white, and red, but not mixed.

**Pool**, a game somewhat similar to billiards but requiring less skill. The game is played on a flat table similar to a billiard table, but with six pockets. There are 15 numbered balls and one white ball, the latter being the cue ball with which the player plays from within the string at any of the numbered balls at the beginning of the game, and afterwards as he finds it upon the table. There are more than a score of variations of the game, such as Chicago, Two-ball, Forty-one, High-low-jack-game, Color ball, Skittle, Kelly, and others.

**Poole, Ernest** (1880- ), American author, was born in Chicago, Ill. He was graduated from Princeton University in 1902 and since then has lived in New York City. In 1915 he was magazine correspondent in France and Germany, and in 1917, in Russia. His published works include *None So Blind*, and *A Man's Friend*, both plays, and the novels *The Harbor* (1915); *Danger* (1923); *The Avalanche* (1924); *The Hunter's Moon* (1925); *The Little Dark Man* (1925); *With Eastern Eyes* (1926); *Silent Storms* (1927); *Great Winds* (1933); *Giants Gone* (1942).

**Poole, William Frederick** (1821-94), American librarian, was born in Salem, Mass. From 1856 to 1869 he was librarian of the Boston Athenæum; from 1869 to 1873 he was librarian of the Cincinnati Public Library, and was later in charge of the new Chicago Public Library until 1887, when he was appointed librarian of the Newberry Library in Chicago, which position he held until his death. He is best-known for his *Index to Periodical Literature*, which appeared in 1853. In 1882, with the assistance of many other librarians, a greatly enlarged edition was published, followed at intervals until 1900 by supplementary volumes edited by William I. Fletcher.

**Poona**, town, and cantonment, India, capital of Poona district, Deccan, Bombay; 120 m. e. of Bombay. It is the headquarters of the Bombay army, and during the rainy season the seat of the government of the presidency. It has two arts colleges and a college of science. Gold, silver, and brass ware, ivory-carving, paper-making and the modelling of small clay figures are its chief industries. Poona is the center of Brahmanical influence in West India; p. 234,000.

**Poona Wood**, the timber of *Calophyllum inophyllum*, an Indian tree belonging to the order Clusiaceæ. It is highly valued for masts and spars, and also for building purposes.

**Poor, Charles Lane** (1866- ), American scientist, was graduated from the College of the City of New York in 1886, and from Johns Hopkins in 1892. He was tutor in mathematics in the College of the City of New York in 1886-88; instructor in mathematics in 1891-92; associate in astronomy in 1892-95, and associate professor of astronomy in 1895-99, in Johns Hopkins. In 1903-4 he was lecturer in astronomy, in 1904-10 professor of astronomy in Columbia University, N. Y., and since 1910 professor of celestial mechanics. His published works include *The Solar System* (1908); *Nautical Science* (1910); *Simplified Navigation* (1918); *Gravitation versus Relativity* (1922); *Relativity and the Motion of Mercury* (1925).

**Poor, Enoch** (1736-80), American soldier, was born in Andover, Mass. When the Revolutionary War began, he was living in Exeter, N. H., and was given command of one of the regiments raised by the New Hampshire province. He participated in the siege of Boston and in the unsuccessful campaign against Canada. In February, 1777, he became a brigadier general, and played a large part in the defeat of Burgoyne's army at Stillwater and Saratoga. He spent the winter of 1777-78 at Valley Forge, fought at Monmouth, and commanded a brigade in General Sullivan's expedition against the Indians.

**Poor, Henry Varnum** (1812-1905), American journalist, was born in Andover, Me. He was graduated from Bowdoin College in 1835, was admitted to the Maine bar, and began to practice in his native town. In 1849 he became editor of *The American Railroad Journal*, the first periodical in the United States to be devoted to railroad news. He assisted his son, H. W. Poor, in the publication of *Poor's Manual of Railroads*, and was one of the promoters of the Union Pacific Railroad Company. He was a prom-

inent writer on financial and economic questions.

**Poor, Henry William** (1844-1915), American publisher, was born in Bangor, Me. He established in New York City the firm of H. V. and H. W. Poor, which dealt extensively in railroad securities. This business required the keeping of a record of railroad statistics for office use, which in a few years became so large and valuable that the firm decided to publish it for public use. It was at once successful, and *Poor's Manual of Railroads* has become a standard work of reference for American railroads.

**Poor Clares.** See **Clare, St.**

**Poore, Benjamin Perley** (1820-87), American journalist. After two years' experience as editor of the *Southern Whig* in Athens, Ga., he was appointed attaché to the United States legation in Brussels. For several years he was foreign correspondent of the *Boston Atlas*, and also an agent for Massachusetts in the collection and copying of papers in the French archives, of interest to New Englanders. In 1848 he settled in Boston, where he edited the *Bee* and the *Sunday Sentinel*. In 1854 he moved to Washington, where he was correspondent for several newspapers. In 1886 he published his *Reminiscences of Sixty Years in the National Metropolis*.

**Poore, Henry Rankin** (1859-1940), American artist, was born in Newark, N. J. He was a pupil of Peter Moran, Lumenais and Bouguereau in Paris. Returning to the United States he gave his attention chiefly to the painting of animals, developing also as a landscape painter, and in many of his pictures the dogs, of which he made a specialty, and other animals, are incidental to the landscape. He received prizes and medals at several exhibitions and world's fairs. Among his best-known paintings are *Close of a City Day* (1888); *Fox Hounds* (1888); *Hounds in Winter* (1898); *Clearing Land* (1903).

**Poor Richard.** See **Franklin, Benjamin.**

**Pope.** See **Papacy.**

**Pope, Albert Augustus** (1843-1909), American manufacturer, was born in Boston. In 1862 he joined the Thirty-fifth Massachusetts Infantry and rendered distinguished service in the Civil War. In 1877 he founded the Pope Manufacturing Company for the manufacture of small patented articles, and in 1878 he began to manufacture bicycles, being one of the pioneers in this field and in the work for better roads.

**Pope, Alexander** (1688-1744), English poet, born in London. His first publication was *Pastorals* (written 1704), which appeared in 1709 in Tonson's *Miscellany*, along with his *January and May*. In 1711 he published the *Essay on Criticism*. It was written in 1709, when he was only twenty; yet it is a marvel of epigrammatic brilliance, and remains the best English statement of the doctrines of classicism. In 1712 he had contributed to Lintot's *Miscellany* the *Rape of the Lock*, a heroi-comical poem. In 1717 he brought out an edition of his works which included, besides the poems already mentioned, the *Temple of Fame* (1711), the *Epistle of Eloïsa to Abélard*, the *Elegy to the Memory of an Unfortunate Lady*, the *Imitations of Chaucer*, and several translations. About 1713 he began his translation of the *Iliad*, which appeared from June, 1715, to 1720. In 1723 he 'undertook' the translation of the *Odyssey*. In 1725 he brought out an edition of Shakespeare (6 vols. 4to), which was severely criticised by Lewis Theobald in *Shakespeare Restored* (1726). Pope's resentment against him and his many other critics embodied itself in the *Dunciad*, which appeared in 1728. About 1730 he undertook, at the suggestion of Bolingbroke, a great didactic poem, comprising a complete system of ethics, and 'vindicating the ways of God to man.' The scheme, however, was not completed, and we have fragments of it in the *Essay on Man* (four epistles, 1732-4) and the first four *Moral Essays* (1731-8). What is now known as the fifth *Moral Essay* ('To Mr. Addison') was written in 1715. The *Epistle to Dr. Arbuthnot* has been well called the *Apologia pro Vita Sua*, and it is perhaps Pope's most striking poem.

His work is the most perfect expression in our literature of the 'classical' theories of poetry, and marks the culmination of a school which, developing with Waller and Denham, attained maturity in Dryden. He is unexcelled in precision, terseness, and epigrammatic brilliance.

**Pope, Franklin Leonard** (1840-95), American electrician. In 1862 he was appointed an assistant engineer to the American Telegraph Company, and in 1864 he became engineer to the Russo-American Telegraph Company, and surveyed a line route between Vancouver and northern Alaska. Afterwards he settled in New York, and entered into partnership with Thomas A. Edison, under the firm name of Pope and Edison. In 1870 they invented a printing telegraph, which, in

an improved form, is extensively used. In 1872 Pope invented the rail circuit for automatically controlling the electric-block signal system in use on American railroads. He also made many valuable improvements in telegraphy, and was one of the pioneer patent attorneys in America, making a specialty of electrical inventions. In 1886 he was elected president of the American Institute of Electrical Engineers.

**Popinjay**, originally a parrot; then a mark like a parrot, put on a pole to be shot at by archers as a test of skill.

**Poplar**. Trees of the genus *Populus* (Salicaceæ). They usually have broad, alternate leaves, generally tremulous, and often with laterally flattened leaf-stalks. The poplars grow rapidly, and, as in the case of the Lombardy poplar (*P. dilatata*), with its narrowly pyramidal head, are picturesque at times. The cottonwood (*P. deltoides*) is common along the watercourses of the West, and forms a large, picturesque, rapidly growing tree; another familiar tree in the West, which turns to pale gold in fall, is the 'quaking asp' (*P. tremuloides*), an aspen with similar, smaller leaves. It springs up quickly in clearings, and holds the soil on mountain sides until other trees are well started. In the East the awkward, brittle poplar of woodlands is *P. grandidentata*, having large, coarsely toothed leaves, a pale-colored trunk of rapid growth, and quickly rotting wood.

**Poplin**, a mixed material of silk and worsted, introduced into Great Britain by the refugees who fled from France on the revocation (1685) of the Edict of Nantes, and ever since it has been a peculiarly distinct Irish industry. Many poplins now made have not a particle of silk in their composition, but are woven of worsted and flax or worsted and cotton.

**Popocatepetl** ('smoking mountain'), a volcano in Mexico, between the valleys of Mexico and Puebla, 45 m. s.e. of the former city. No considerable eruption has occurred since 1548, although minor eruptions took place in 1802, and the crater still emits smoke and ashes. Snow covers the summit (17,783 ft. above sea level), below which are forests of pine and oak. Sulphur of great purity and in large quantities is obtained from its crater.

**Poppy** (*Papaver*), a genus of plants, almost all with showy red, white, or yellow flowers, and all valuable as annual or perennial garden plants. The common corn poppy is *P. Rhæas*; and of it numerous varieties are cultivated in gardens, such as the Shirley, car-

nation-flowered, and ranunculus-flowered poppies. The Oriental poppies are among the showiest of hardy perennial plants. *P. somniferum*, a tall annual plant with glaucous foliage, is the source from which opium is obtained.



Poppy.

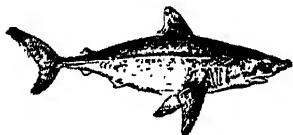
1, Ripe capsule; 2, section;  
3, seed; 4, section.

**Popular Sovereignty, or Squatter Sovereignty**, is a term applied in the United States before the Civil War to the doctrine that each Territory should be left free to decide for itself whether or not slavery was to be permitted within its limits. The doctrine seems to have been first enunciated by Lewis Cass in 1847; but Stephen A. Douglas was its most aggressive and conspicuous advocate, and it was the basis of the famous Kansas-Nebraska Bill of 1854. In 1857 the U. S. Supreme Court, in the Dred Scott decision, declared that neither Congress nor Territorial legislatures had power to exclude slavery from the Territories. See SLAVERY.

**Population**, the number of people in any particular country or community. A study of population figures seems to indicate that under normal conditions the population of a community should increase steadily; but a stationary population may signify increased thrift and a higher standard of comfort, with a relatively large proportion of the people distribu-

ted among the effective age groups, and with a relatively small proportion of infants and dependents represented. An increasing population resulting from a high birth rate is actually less desirable than a low death rate and a greater average duration of life. At the present time, the increase of population is of less concern than its character, and sociologists and economists are investigating carefully the great problems arising from the rapid development of densely populated centers. There is no absolute standard of population or over-population. The density of population—the average number of persons per square mile—may increase without causing serious suffering, provided the opportunities to secure subsistence increase correspondingly. A certain density of population is necessary to really effective social and political life; while an excessive density is detrimental to the health, and destroys the comfort of the inhabitants.

**Porbeagle** (*Lamna cornubica*), a shark which occurs in the North Atlantic Ocean, and which is known among American fishermen as a mackerel shark. It reaches a length of ten ft., and feeds chiefly on fish.



Porbeagle.

**Porcelain**, the material of the highest class of ceramic ware, is composed of a kind of clay (kaolin) mixed with feldspar and covered with a glaze. It is frequently decorated either under or over the glaze. By porcelain is now generally meant hard porcelain, the secret of which was discovered in China.

The process that distinguishes porcelain from pottery is the hard firing. In Chinese porcelain the body of kaolin and the glaze of feldspar are fired together at a temperature of about 1,400° Centigrade, or over 3,000° Fahrenheit. In European porcelain the body, of mixed kaolin and feldspar, is fired at a low temperature; then, having been dipped in the glaze, it is fired at a very high temperature.

The materials of porcelain were discovered in Europe in 1709 by Böttger, chemist to the Elector of Saxony, who established the Dresden manufactory. The Sèvres factory, established by royal decree, began to make porcelain in 1768, while factories were established in the towns of Plymouth and Bristol in England.

**Porch**, a covered space immediately in front of the entrance to a building, open in front, and more or less enclosed at the sides. A porch is only a subordinate part of a building, whereas the portico may be the whole of a front.

**Porcupine**, a family of rodents. In Europe, Asia, and Africa occur the members of the genus *Hystrix*. The most familiar species is *H. cristata*, found in S. Europe and N. Africa. The American porcupines differ in several respects from the Old World forms; they are all arboreal in their habits, and with the exception of the northern forms (*Erethi-*



North American Porcupine.

*zon dorsatus* and *E. epivanthus*), all possess prehensile tails. In the common porcupine of Eastern North America the spines are short, and are concealed by the long hair. They are also easily detached, and are slightly barbed at the points. The tail is broad and massive, and is the chief active means of defence, the animal delivering powerful lateral blows with it.

**Porgy**. See **Scup**.

**Pork**, the flesh of the pig, exclusive of bacon and ham. Bacon is the sides and back of the animal and ham the thigh, both being salted and smoked.

**Porosity**, a term indicating the presence of minute holes or pores throughout an otherwise solid body. Pores may vary much in size: thus in sponge and pumice stone the pores are obvious; but in charcoal and unglazed earthenware they require to be demonstrated by the way in which such substances can suck up liquids or gases, or allow the passage of liquids or gases through them. Porosity is made use of to absorb liquids and gases, as in the use of blotting-paper, or charcoal for filtration of liquids, and in separating gases by diffusion.

**Porphyry**, a beautiful igneous rock showing bright-red spots on a dark-red ground. The *porfido rosso antico* was much admired by the ancients, who used it for interior decorations and objects of art. Its color is due to the presence of a red or pink variety of epidote. The rock itself would at the present day be classed rather among the porphyrites than the porphyries, as its feldspar is mainly plagioclase; it contains also dark-brown hornblende.

At present the term, when used alone, is in strict usage restricted to a group of acid and sub-acid rocks, containing phenocrysts of orthoclase feldspar. Granite porphyries are pink or gray rocks, with pale feldspars, dark plates of mica, and gray or colorless blebs of quartz in a micro-crystalline or felsitic quartzo-feldspathic or granophyric ground-mass. Quartz-porphyrries usually show rounded quartzes in a fine, stony matrix.

**Porpoise**, a name applied by sailors indiscriminately to any of the smaller toothed whales, but which should be restricted to the members of the genus *Phocaena*, of which *P. communis*, the common porpoise, is abundant in all northern oceans. It reaches a length of about five ft., and has a rounded muzzle, not prolonged into a beak, as in the dolphin. The upper surface is almost black, and the under, which is constantly shown as the porpoise rolls in the water, is pure white. The two tints gradually fade into each other.

**Porsena, Lars**, in ancient Roman legend, king of Clusium in Etruria, who soon after the expulsion of the kings of Rome in 509 B.C. tried to restore Tarquin. He took the fortress on the hill Janiculum, on the right bank of the Tiber, and would have crossed into Rome by the pile-bridge but for the bravery of Horatius Cocles. See Macaulay's *Lays of Ancient Rome*.

**Portage**, city, Wis., county seat of Columbia co., on the Wisconsin R. and the government ship canal between the Fox and Wisconsin Rs. Steamboats run regularly to and from Green Bay. It is the center of a region fertile in grain and tobacco, with mineral deposits of iron, copper, and marl. The chief manufactures are pickles, bricks, hosiery, underwear, flour, shoes, sashes, and blinds. There are iron works and grain elevators. The vicinity was one of the first localities explored by Father Marquette and was the scene of the Black Hawk War. The historic Fort Winnebago is just outside the city limits; p. 7,016.

**Portage Lake**, a lake in Houghton co., Mich. Its s. part is connected with Keweenaw Bay by a narrow channel called Portage Entry. It is nearly 20 m. long and 2 or 3 m. wide, and is navigable by large vessels. A ship-canal nearly  $2\frac{1}{2}$  m. long and 100 ft. wide connects its n. end with Lake Superior, enabling steamboats on the latter to pass through a route shorter than around Keweenaw Point.

**Portage la Prairie**, tn., Manitoba, Canada, co. seat of Portage la Prairie co., is the market of a fertile farming region and has flour mills, brickyards, grain-elevators, and

manufactories of aerated waters, farm implements, pumps; p. 6,574.

**Portalis, Jean Etienne Marie** (1746-1807), French jurist, was born in Beausset, near Toulon. He incurred the animosity of Robespierre during the French Revolution and was arrested in 1793, but was released on the fall of his enemy, and became president of the Council of Ancients. In 1800 he was employed by Napoleon to assist in drafting the famous *Code Civil*.

**Portal System**, the four large veins, the superior and inferior mesenteric, the gastric, and the splenic, which unite to form the portal vein, carrying venous blood from the viscera concerned in digestion to the liver.

**Port Angeles**, city, Washington, county seat of Clallam co., situated on the Strait of Juan de Fuca. It has a good harbor, is engaged in the lumber industry, and has several creameries. In the vicinity are two lakes affording splendid trout fishing; p. 9,409.

**Port Antonio**, seaport town, situated on the north coast of Jamaica, British West Indies; the second commercial city of the island and the center of the fruit trade; p. 7,074.

**Port Arthur**, city and port of entry, Thunder Bay district, Ontario, Canada, situated on an arm of Lake Superior. The city has steam-connection with Duluth, Minn., and with Owen Sound on Lake Huron, and is one of the chief commercial points on the northwest shore of Lake Superior. It is the seat of extensive lumbering and mining interests, has numerous grain elevators, and manufactures tents, awnings, and bricks; p. 16,134.

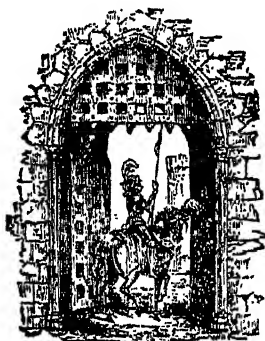
**Port Arthur** (Chinese Lu-shun-kau), naval and commercial port, situated at the southeastern extremity of the Liao-tung peninsula, Manchukuo. It is situated on the northern and eastern sides of a bay of the Yellow Sea and is surrounded by rocky hills. The harbor entrance, which is ice-free, is about 380 yds. broad. Port Arthur was taken by the Japanese in 1894 during the Chinese-Japanese War, but, upon the intervention of Russia, France, and Germany, was returned to China. In 1898 it was leased by China to the Russians, who fortified it and made it their chief naval base in the Far East and the terminus of the Siberian Railway. It was attacked by the Japanese at the outbreak of the Russo-Japanese War, and capitulated after a prolonged siege. The treaty of Portsmouth (1905) awarded it to Japan for the remainder of the period of the Russian lease, and in 1915 the lease was extended to 99 years; p. 14,000.

**Port au Prince**, the capital and largest city of Haiti, W. I., is situated on the Gulf of Gonâves on the western coast of the island. The buildings, mostly of wood, present a unique appearance interspersed with handsome trees. The chief features of interest are the cathedral, and the central market where produce from all parts of Haiti is displayed. The city has a good fortified harbor, the greater part of the island's foreign trade being carried on through Port au Prince. The chief exports are coffee, cacao, logwood, and cotton. Port au Prince was founded in 1749. It was almost entirely destroyed by earthquake in 1770; p. between 80,000 and 90,000.

**Port Chester**, village, Westchester co., New York, on Long Island Sound; 26 miles n.e. of New York City. It contains a public library, hospital, and a park. Industrial establishments include iron foundries and manufactures of bolts and nuts, shirts, and stoves; p. 23,973.

**Port Clinton**, village, Ohio, county seat of Ottawa co., on Lake Erie, at the mouth of the Portage River; 14 m. n.w. of Sandusky, with which it is connected by trolley. It has a good harbor and a considerable lake trade. Grapes and peaches are raised in the surrounding country; p. 4,595.

**Portcullis**, a barrier formed of large pieces of wood joined across one another like a harrow, and each pointed with iron at the bottom. It was generally hung vertically over the gateways of old fortified towns and castles, ready to be let down in case of a surprise before the gates could be shut.



Portcullis

**Port Darwin**, a large inlet, Australia, on the n.w. coast of the Northern Territory. On it stands the town of Palmerston.

**Port de Paix**, town, Haiti, on the strait between Haiti and Tortuga, and at the mouth of the Trois Rivières. Coffee is its principal

product. Columbus visited this port in 1492; p. 10,000.

**Porte, Sublime**. See **Constantinople; Turkey**.

**Port Elizabeth**, seaport town, Cape of Good Hope, South Africa, on Algoa Bay. The harbor is commodious, and the city is an important port, being known as the Liverpool of South Africa; p. 45,927, of which number 19,987 are colored.

**Porter, Benjamin Curtis** (1843-1908), American painter, was born in Melrose, Mass. At first a figure painter, he gradually turned his attention to portrait painting. His portraits of leading society women of Boston and New York are characterized by grace and distinction.

**Porter, David** (1780-1843), American naval officer, was born in Boston. In April, 1798, he was appointed a midshipman in the American navy, and saw his first active service on board the *Constellation* in her battle with the French frigate *l'Insurgente* in February 1799. At the outbreak of war with Great Britain, in 1812, Porter was promoted to captain, and was given command of the frigate *Essex* of 32 guns. In January, 1813, proceeded to the Pacific Ocean for the purpose of protecting American shipping and inflicting as much damage as possible upon that of the enemy. After the close of the war, Porter was for eight years a member of the board of navy commissioners. In 1824, having attained the rank of commodore, he was sent to the West Indies in command of an expedition against the pirates. David G. Farragut was his son by adoption.

**Porter, David Dixon** (1813-91), American admiral, son of Commodore David Porter, was born in Chester, Pa. He accompanied his father in 1824 in his expedition against the West Indian pirates. When the Civil War broke out, Porter had attained only the rank of lieutenant, but his rise thenceforth was extremely rapid. He commanded the *Powhatan* in the relief of Fort Pickens, and assisted in operations against Vicksburg and other places above New Orleans. In September, 1862, however, he was ordered to command the Mississippi squadron as acting rear-admiral. He established a navy yard at Mound City, and by converting ordinary river steamers into gunboats soon had a fleet of more than 120 vessels. With these, in January 1863, he assisted the army in the capture of Arkansas Post, and not long after successfully ran past the guns of Vicksburg and captured Grand Gulf. In October 1864, Porter was assigned to command

the North Atlantic squadron. With this fleet, consisting of more than 50 vessels, he bombarded and silenced the Confederate fortifications at the mouth of the Cape Fear River (December 24). His last duty in the Civil War consisted in forcing his way up the James River and assisting in the final operations against Richmond.

In July 1866, he was promoted vice-admiral, and during the next three years, as superintendent of the Naval Academy, effected a revolution in that institution. In 1870 he was commissioned admiral—one of the first two men to receive that distinction in American naval annals, the other being Farragut.

**Porter, Gene Stratton** (1868-1924), American novelist, was born in Wabash co., Indiana. Her best-known books were *Freckles* (1904), which was very popular; *A Girl of the Limberlost* (1909); and *Michael O'Halloran* (1915).

**Porter, Horace** (1837-1921), American soldier and diplomat, son of David R. Porter, governor of Pennsylvania, was born in Huntingdon, Pa. He was with the Army of the Cumberland in the Chickamauga and Chattanooga campaigns, and was on the staff of General Grant during the campaigns of 1864-5 in Virginia. General Porter was Assistant Secretary of War and private secretary to General Grant during his first administration, and subsequently raised the funds for the building of Grant's Tomb in New York City. He was ambassador to France from 1897 to 1905.

As the result of a personal investigation, while ambassador, which resulted in locating the burial place of John Paul Jones, he supervised in 1906, under commission of the United States Government, the transfer of the remains from Paris to Annapolis, Md. He was a delegate to The Hague Peace Conference in 1907.

**Porter, Jane** (1776-1850), English novelist, was born at Durham. In 1803 she published *Thaddeus of Warsaw*, following it in 1810 with *The Scottish Chiefs*. Both were enormously successful.

**Porter, Noah** (1811-92), American educator and writer on philosophy, was born at Farmington, Conn. He filled Congregational pastorates at New Milford, Conn., and Springfield, Mass., from 1836 to 1846, and then accepted the chair of moral philosophy and metaphysics at Yale, which he continued to hold after succeeding to the presidency of the college in 1871. He retired from both offices in 1886. During his administration the modern elective system was introduced at Yale; and

during this period the material prosperity of the college was very marked.

**Porter, Peter Buel** (1773-1844), American soldier, was born in Salisbury, Conn. He was elected (1809-13) to the eleventh and twelfth Congresses. In Congress he played a prominent part in bringing on the War of 1812; served with distinction at Chippewa, Lundy's Lane, and the defence of Fort Erie; was for a short time attorney-general of New York; was one of the commission which explored the route for the Erie Canal; and in 1838-9 was Secretary of War under John Quincy Adams.

**Porter, Robert Percival** (1852-1917), American journalist and statistician, born in Norfolk, England. He came to the United States in 1867, and in 1872 joined the staff of the Chicago *Inter-Ocean*, devoting himself to economic questions. He was on the editorial staff of the New York *Tribune* and the Philadelphia *Press* (1884-7). He was superintendent of the Eleventh Census (1890-4), and special fiscal and tariff commissioner to Cuba and Porto Rico under President McKinley. He joined the staff of the London *Times* as editor of the engineering supplement (1904), principal correspondent for North America (1906), and editor of the South American and Japanese supplements (1909-10).

**Porter, Sidney** (1862-1910), American author, better known under the pseudonym 'O. HENRY,' was born in Greensboro, N. C., and was educated in private schools in Texas. He wrote for the Houston *Post*, and became editor and publisher of the *Iconoclast*, later the *Rolling Stone*, in Austin. On the failure of this enterprise, he went to New York and engaged in literary work, contributing largely to magazines and newspapers. His stories, which have attained wide popularity, show first-hand acquaintance and sympathy with the life of the poor in New York City, combined with lively humor. Among his published works are *Cabbages and Kings* (1905); *Four Million* (1906); *Trimmed Lamp* (1907); *Voice of the City* (1908); *Roads of Destiny* (1909).

**Port Hope**, chief town and port of entry, Durham co., Ontario, Canada, on the north shore of Lake Ontario. The town has a fine harbor, with steamship connections with the principal lake ports. There is a good trade in grain and lumber. Fishing is carried on by a large fleet; p. 6,000.

**Port Huron**, city, Michigan, county seat of St. Clair co., on Lake Huron, at the mouth of



the St. Clair River. It is connected with Chicago, Detroit, and other ports by steamer, and is opposite Sarnia, Ont., with which it is connected by ferry and a railroad tunnel under the St. Clair River. The city is well known as a summer resort, and has mineral springs.

Port Huron is a port of entry on the Great Lakes, with a deep river channel. It is an important manufacturing and commercial center. It is the site of old Fort Joseph, which was built in 1686. It was settled in 1790, and in 1814 the U. S. Government erected Fort Gibraltar here; p. 32,759.

**Portion**, in law, is a provision of a substantial character made by a father for his children—by marriage settlement, or the purchase of a business.

**Port Jervis**, city, Orange co., New York, at the junction of the Delaware and Neversink Rivers; 88 m. n.w. of New York City. The many picturesque waterfalls, mountains, and general scenic beauty have made the place a popular summer resort. Tri-States Rock, just s. of the village, marks the intersection of the boundary lines of New York, New Jersey, and Pennsylvania; p. 9,749.

**Portland**, largest city and chief seaport of Maine, county seat of Cumberland co., on Casco Bay, has direct steamship service with Boston, New York, St. John, N. B., and Portland, Ore., and intermediate points, and is the winter port for several trans-Atlantic lines. The deep and spacious harbor is one of the best on the coast, and is protected by extensive modern defences. It has a 35-foot channel at mean low tide, from ocean to docks. The city is situated on an elevated peninsula, and occupies an area of 18 sq. m. The eastern end, Munjoy Hill, is encircled by the Eastern Promenade, which commands a superb view of Casco Bay, with its numerous islands, many of which are popular summer resorts. The Longfellow house (1785), in which the poet lived, is now part of the Maine Historical Society's library. Portland has an extensive coastwise trade, and commerce with Europe and the West Indies. There are also important fishing interests, and some shipbuilding.

The first permanent settlement was made by the English in 1632. During the American Revolution the town was bombarded and partly burned by the British. In 1786 it was incorporated under its present name; p. 73,643.

**Portland**, largest city of Oregon, and county seat of Multnomah co., is situated on the Willamette River, 12 m. above its junction with the Columbia, at the terminus of the

Great Northern, the Northern Pacific, the Southern Pacific, the Union Pacific, the Canadian Pacific Railroads. Located at the head of deep water navigation on the Columbia River system, the city has regular water communication with Puget Sound, Atlantic and Pacific Coast ports, South America, British Columbia, Alaska, Europe and the Orient. Its fine fresh water harbor is accessible for large ocean-going steamers at all times, and 27 ocean and coastwise steamship lines and 14 river lines run from the port. The climate is mild and equable; the summers are cool and comfortable, and the winters moderate, with but little snow. Portland covers an area of 66.36 sq. m., and is built on slopes which rise gradually from either bank of the river. The main business and industrial section lies on the w. side, and the residential district on the e., traffic between the two being served by bridges and ferries. Council Crest, in the western part, commands an impressive view of the fertile river valleys, with the snow-capped peaks of Mounts Hood, Adams, Rainier, St. Helen, and Jefferson towering on the horizon. The Columbia River Highway, which passes through Portland, reaches w. to the Pacific and e. to Central Oregon, and connects with the Old Oregon Trail in Eastern Oregon. A National Forest Park parallels the Highway between the city and Hood River and the Highway pierces the heretofore inaccessible gorge of the Columbia River. Noteworthy edifices of Portland are the Custom House, Post Office, and Federal Court Building, each occupying an entire city block, the City Hall, Union Depot, County Court House, Museum of Art, and Northwestern Industrial Exposition and Chamber of Commerce Building. The city has about 150 churches. Educational institutions include the department of medicine of the University of Oregon, Reed College, the North Pacific College of Dentistry and Pharmacy, St. Helen's School for Girls, St. Michael's College, Hill Military Academy, and Columbia University (Roman Catholic).

The leading industries are lumber and timber manufactures, printing and publishing, fruit and vegetable canning and dehydration, foundries and machine shops, ship-building, bakeries, butter, cheese, and condensed milk factories, copper, tin, and sheet iron products, woolen and worsted mills, leather goods, flour and grist mills, confectionery, men's clothing, and slaughtering and meat packing. The city has also many mercantile houses, and banking institutions. Portland is the leading lumber exporting port in the world, and one of

the leading wheat ports of the United States.

The population of Portland is 305,394. It was 821 in 1850, 8,293 in 1870, 46,385 in 1890, 207,214 in 1910. Since 1912 Portland has been governed by a board of five commissioners (one acting as mayor), elected by popular vote for four years on an alternating basis. Portland was founded in 1845 by A. L. Lovejoy and T. W. Pettygrove, New England real estate men, who named it after Portland, Me. It was chartered as a city in 1851. The Lewis and Clark Centennial Exposition was held here in 1905.

**Portland Canal**, an inlet of British Columbia which stretches from Dixon Entrance

hydraulic cement was developed between 1756 and 1824. Portland cement is a fine powder of dark gray to greenish color, weighing about 90-100 lbs. per cubic foot (packed in bags of 94 lbs.), and of specific gravity (weighed in oil) from 2.9 to 3.2. It does not deteriorate by storage, if kept dry. Mixed with about 25 to 30 per cent. of water, it forms a smooth paste which by mixing with one to three times its bulk of sand becomes *cement mortar*. Mortar mixed with two to three times its bulk of gravel or broken stone becomes *concrete*, by far the most important use of Portland cement. In final consistency, mortar or concrete is like a hard limestone or trap, and in



*Portland, Oregon: The Gorge of the Columbia as seen from the Columbia River Highway.*

of Hecate Strait in a northwesterly direction for about 80 m., and which opens into the Pacific at lat. 55° 25' N. The Alaskan boundary arbitrators decreed in 1903 that the boundary line should run from Cape Murzon, the southern extremity of Prince of Wales Island, up Portland Canal, leaving the islands Wales and Pearse within the British limits.

**Portland Cement**, one of the general class of cements second only to steel in importance as an engineering material, is an artificial product similar to natural (Roman, Rosendale) cements, but superior to them in strength. Portland cement is produced by mixing finely pulverized limestone (or chalk or marl) and clay (or shale), in proportions of about 75 to 25; grinding them together; then burning (clinkering) the mixture at very high heat; and lastly, grinding the resulting slag (clinker) to an impalpable powder. The fact that such a process produces a valuable

both tensile and crushing strength it is equal to good specimens of best stone. In this stone-forming powder lies the entire value of Portland cement. In American manufacture, the cement is burned in rotary kilns, which are horizontal, slightly inclined steel cylinders 6 ft. in diameter, 60 to 150 ft. long, lined with refractories, rotated by power, having a flame fed by pulverized coal blown in at the lower end, and the cement mixture fed in at the other or chimney end. This machine has a large capacity, and is economical of labor and fuel. The largest amount of Portland cement is made in the United States. Eastern Pennsylvania was the original center of manufacture, and is still the largest producer; but cement plants now exist in nearly every State. See CEMENT; CONCRETE.

**Port Louis**, the capital and principal port of the British colony of Mauritius, is situated on an excellent harbor on the n.w. coast. It is defended by forts; is a coaling station of

the British navy; and has barracks and military storehouses. There are three graving docks beside the harbor, through which all the commerce of Mauritius passes. The city contains a Protestant and a Roman Catholic cathedral, royal college, observatory, and botanical gardens; p. 50,000.

**Port Natal**, South Africa. See **Durban**.

**Porto Alegre**, capital of the state of Rio Grande do Sul, Brazil, stands near the n. end of Lagoa dos Patos ('Lake of Ducks'). It is favorably situated at the convergence of five navigable rivers, and is connected with the bar of Rio Grande do Sul by the Lagoa dos Patos. Extensive harbor improvements make it accessible for large vessels. The city is laid out on modern lines, with well-built streets and large squares. Porto Alegre is the principal shipping point of Northern Rio Grande do Sul, the export trade amounting to \$1,500,000 annually, and the import trade to \$11,000,000; p. 110,000.

**Port of Spain**, chief town and port of Trinidad, West Indies. It has wide thoroughfares and handsome buildings, including a royal college, governor's house, and Protestant and Roman Catholic churches. In active trade it has supplanted St. Thomas, and numerous lines of ocean steamers call regularly; p. 64,000.

**Portolá, Gaspar de**, Spanish pioneer, who in 1769, with a small company, travelled from Mexico through the hitherto unexplored regions of California, and discovered the Bay of San Francisco. He founded a number of settlements, and became the first governor of California. In 1909 a commemorative pageant was held in San Francisco.

**Porto Maurizio**, prov., Italy, bounded on the e. by Genoa, s. by the Mediterranean, and w. by France. It is mountainous throughout, belonging to the Maritime Alps. Fruit, wine, and olive oil are produced, and fresh-cut flowers are exported, especially from San Remo. Area, 455 sq. m.; p. 160,000.

**Porto Maurizio**, town, capital of Porto Maurizio province, picturesquely situated on a promontory. Surrounded by dense olive groves, the town is a favorite winter resort. It has a well-sheltered harbor, and a brisk trade in olive oil; p. 8,000.

**Porto Novo**, seaport, India, in South Arcot, Madras, on the Coromandel coast; 145 m. s. by Madras by rail. Here on July 1, 1781, Sir Eyre Coote defeated Haider Ali.

**Porto Rico** (Spanish *Puerto Rico*), an island belonging to the United States, one of the

West Indies and the easternmost and smallest of the Greater Antilles. It lies 1,000 m. e. of Key West, and 75 m. e. of Haiti; total area of 3,435 sq. m. The coast line is comparatively smooth, and extends for a distance of 360 m. During the winter the wind often blows with such violence on the n. coast that anchorage is dangerous, except in the port of San Juan. The entire surface of the island, save for a narrow coastal plain on the n. and a somewhat wider plain on the s., is a mass of mountains, ridges, hills, and peaks interspersed with deep valleys, high tablelands, precipitous canyons or ravines, and a few small interior plains. Several large rivers and numerous smaller streams flow from the central mountain range. None of the rivers is navigable for any great distance, but they are important sources of irrigation. The climate is equable and comparatively healthful. The mineral resources of the island are practically unexplored although the existence of extensive deposits of valuable ores is known.

Porto Rico is notable for the beauty and brilliancy of its flora, though the abundant forests which formerly clothed the mountain slopes have been destroyed in all but a few sections, held by the government as forest reserves. Porto Rico is essentially an agricultural country, and practically the entire population is engaged in agriculture or allied industries. To supply the water needed for crops, particularly for sugar cane, the chief product of the southern coast, extensive irrigation is required.

The staple agricultural products are sugar, coffee, tobacco, and fruits. Since the American occupation, the cultivation of citrus fruits and pineapples has made great progress, and there are now several thousand acres of fine orange and grapefruit groves in bearing, and a lesser number of acres devoted to pineapples.

**Manufactures.**—Manufacturing is concerned chiefly with the products of agriculture.

**Transportation.**—Communication is difficult, owing to the mountainous configuration of the interior, but transportation facilities are excellent. The population of the island, according to the U. S. Census of 1940, is 1,869,225. San Juan, the capital and chief city, has a population of 169,247.

**Education.**—The Porto Rican school system is founded on American principles and comprises rural, elementary graded, continuation and high schools, as well as an excel-

lent university. School affairs are in charge of a centralized Department of Education.

**Government.**—The government of Porto Rico is based upon the 'Organic Act' passed by the U. S. Congress in 1917 and known as the 'Jones Act,' which conferred American citizenship upon the Porto Ricans and gave them a new system of government. Under its provisions the executive authority is vested in a governor appointed by the President of the United States. The six department heads form a council to the governor, known as the Executive Council. The legislature consists of two elective houses—the Senate of 19 members (2 from each of the seven senatorial districts and five members at large), and the House of Representatives of 39 members (1 from each of the 35 representative districts and four members elected at large). Porto Rico has, as its representative in the Congress of the United States, a Resident Commissioner elected by the people.

The judicial system comprises a supreme court, eight districts, thirty-five municipal, and various inferior courts. Under the Organic Act there is also provided 'The District Court of the United States for Porto Rico,' which has jurisdiction over all cases cognizable in the district courts of the United States. The chief justice and four associate justices of the supreme court, and the judge, together with certain other officials of the United States District Court, are appointed by the president, while the officials of the other courts are named by the governor. There are three political parties, the Unionists, who favor independence; the Republicans, who advocate statehood; and the Socialists.

Porto Rico was discovered in 1493 by Columbus, although it was not occupied until 1508, when Ponce de Leon subdued the Indians and founded the city of San Juan. An autocratic system of government was established by the early Spanish settlers, and the natives, subjected to a rigorous system of forced labor, diminished so greatly in numbers that negro slave labor was introduced about 1775. In 1869 Porto Rico was made a Spanish province; in 1873 slavery was abolished; and in 1897 an autonomous form of government was granted. Before this could be put into effect, however, the United States declared war on Spain. As a result of these operations Porto Rico was ceded to the United States by the Treaty of Paris, signed on Dec. 10, 1898. Since the American occupation, the cities have provided pure water

supplies and modern methods of sewage disposal; roads have been built; yellow fever and smallpox have been eliminated; bubonic plague has been controlled; and an active campaign has been waged against hookworm. Education has been fostered and illiteracy greatly reduced, especially in the cities. In Sept., 1928, Porto Rico was visited by a terrific hurricane with a wind which attained a velocity of 150 miles. Vast groves of palm and fruit trees were uprooted, buildings were overturned, crops were totally destroyed and many lives were lost. During the persistent economic depression Porto Rico suffered from continuing low wage scales. There was considerable agitation for admission to the Union, and some sentiment for independence. In April, 1934, the Insular Legislature adopted a resolution petitioning Congress to grant Statehood with a large measure of autonomy. A bill was introduced into the Senate in 1936, calling for a popular referendum on independence, a transitional commonwealth, and the ending of American financial aid, but it was not enthusiastically received on the island, and the bill was not pressed.

**Porto Rico, University of,** a co-educational institution of higher learning located in Río Piedras, Porto Rico. It was created by Act of the Legislature, March 12, 1903.

**Portrait Painting.** Portraiture absolute would be a life-size colored statue, and the closest actual approach to this is the wax figure. But the difficulties and unsatisfactoriness of this form, both artistic and practical, are prohibitive, and it has never borne any rank in art. Uncolored portrait statuary has engaged far abler hands, and in ancient Egypt and imperial Rome the portrait bust was a favorite, and rose to a high level of merit; but its limitations are too great to compete with painting.

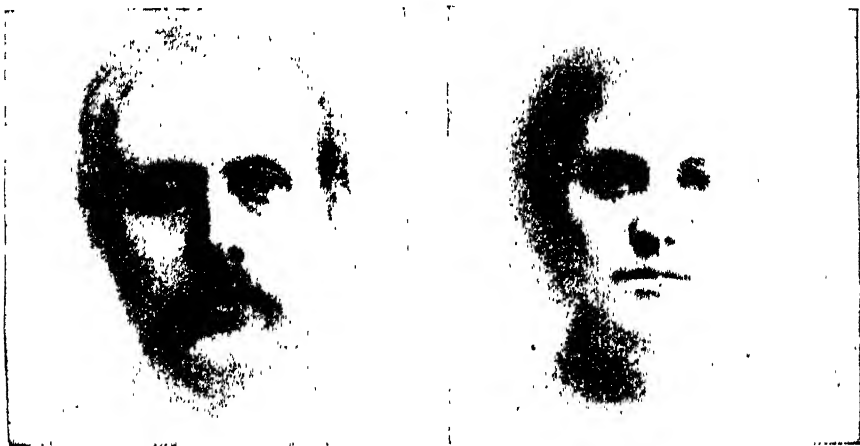
The present art is entirely modern. The early Egyptian form was conventional figures in flat tints on mummy cases; later panels of true and expressive portraiture prove that it was not for lack of ability. Greece of the fifth and fourth centuries B.C. had portrait art as famous, and therefore beyond doubt as masterly, as any other branch; but no works survive. With Greek freedom went its art; Rome cared little for it, and mostly copied the Greek poorly; early Christianity was against art, and later took it up only to sink it to Byzantine conventionalism.

The living system begins with Giotto (1266-1337), who places some real portraits, including Dante, among his 'citizens.' Ma

saccio (1401-28) made this a regular practice, perhaps finding real faces easier than fancy ones; most of the great fifteenth-century masters did likewise, as Filippo Lippi, Benozzo Gozzoli, and above all Ghirlandajo (1449-94), whose frescoes are a gallery of Florentine aristocracy. Paul Veronese (1528-88) continued the practice.

The separate individual portrait, comprising the picture's sole interest, certainly furnished commissions at least by the early 14th century. It was greatly forwarded by the new oil paints which also made printing possible, their invention credited to the Flemish Van Eycks, Hubert and Jan. The latter (c. 1390-1440) was a wonderful portrait artist,

pictures as mere sketchy suggestions. The German school is next in time. Its foremost name is Hans Holbein (1497-1543), who went to England in 1526, and became court painter to Henry VIII. The Dutch school in average merit stands perhaps at the very head. The first great name is Frans Hals (1580-1666), who showed amazing skill in that most difficult form, the huge portrait groups so favored in Holland, whose members often clubbed on shares for cost of inclusion. Van der Helst (1613-70) was another master in this kind. But the chief name, and one of the greatest of all time, is Rembrandt (1606-69); he and Velázquez are perhaps the supreme portraitists of the



*Composite Portraits.*

Left, Ten members of a club; Right, 49 members of college class.

the greatest in the Flemish school before or with Van Dyck.

Nearly contemporary was the Italian portraitist Jacopo Bellini (c. 1400-66). But the first great pioneer of advance on the art side was Leonardo da Vinci (1452-1519), whose treatment of shade gave his figures a new effect of roundness; his work is very scant, however, the most famous the *Mona Lisa*. Raphael (1483-1520) is a still greater name; but chief of all was Titian (1477-?1576), who also gave more attention to portraits than either. Even he has other claims to remembrance. Of almost pure portrait artists, with little note beyond, the first important name is G. B. Moroni (1525-78). All these painted all parts with equal care: the first innovator was the vehement idea-ridden Tintoretto (1518-94), the founder of 'impressionism,' who deliberately left parts of his

world. After Holbein, the greatest was the Fleming Van Dyck (1599-1641), the most influential artist ever in England, and some of his influence ill. His direct successors were Germans, Peter Lely and Godfrey Kneller; clever craftsmen without genius. Suddenly, a century after Van Dyck's death, there arose a splendid native school headed by three great painters, contemporaries practically through life: Joshua Reynolds (1723-92), Thomas Gainsborough (1727-88), and George Romney (1734-1802). The most powerful direct inheritor of Reynolds' style was Henry Raeburn (1756-1823), unfortunately scant of training, provincial, and with some bad conventions; the most popular was Thomas Lawrence, whose name does not grow.

The great reformer of English portraiture was John Millais (1829-96), who entirely dis-

carded the factory plan and painted all parts himself from the sitters. All since have followed his example. He was of the Pre-Raphaelite body, but later developed a wholly original style quite without mannerisms. Frank Holl (1845-88), with a narrower range and more conventions, had great power and character. George Frederick Watts (1817-1904) was a poetic and intellectual artist who sought to express ideas and emotions, despised realism, and slighted technique.

By far the greatest names in recent portrait art were J. A. M. Whistler and John S. Sargent, both American by blood.

**Portraits, Composite**, a method of indicating the facial characteristics of a family or group of persons, while at the same time suppressing the peculiarities of individual members. The results are recognized as of considerable value to the student of anthropology. One way of obtaining these composite portraits is to take full-face photographs of each person composing the group, of such a uniform size that two fixed horizontal lines pass, one through the inner angle of the eyes, the other through the line dividing the lips, while a third fixed perpendicular line equally divides the nose. By this means the photographs are brought approximately to the same size, and corresponding portions of the various faces occupy similar positions.

**Port Royal**, town, Beaufort co., South Carolina. Port Royal has often figured in American history. In 1665 the forces of the Spanish Menéndez de Aviles massacred a band of French Huguenots who had erected a fort in the neighborhood during the preceding year. At the beginning of the Civil War, Confederate troops under Gen. Thomas F. Drayton blocked the entrance to Port Royal Sound by building Forts Walker and Beauregard. ; p. 342.

**Port Royal**, fortified town at the entrance to Kingston harbor, Jamaica, West Indies. It has a British naval dockyard, military hospital, barracks, and arsenal. On March 11, 1911, the navy yard was wiped out by a destructive fire.

**Port-Royal des Champs**, a celebrated convent of Cistercian nuns, founded in 1204, and originally situated about 8 m. s.w. of Versailles. The community removed to Paris in 1626, and in 1663 to Port-Royal de Paris, and became devoted to the use of a lay community. Port-Royal is best known for its adhesion to the Jansenist movement.

**Port Said**, town and seaport at the western

entrance to the Suez Canal, on a strip of land between Lake Menzaleh and the Mediterranean, owes its origin (in 1860) to the Suez Canal, being named for Said Pasha, its promoter. A statue of De Lesseps, the constructor of the canal, stands on the breakwater, and there is a lighthouse in the town, visible 24 m. at sea. Port Said is the residence of the governor-general of the canal. It is one of the largest coaling stations in the world; p. 200.899.

**Portsmouth**, city and seaport. Hampshire, England; 18 m. s.e. of Southampton. It has the greatest arsenal and is the most strongly fortified place in the United Kingdom. The younger Brunel, Charles Dickens, Sir Walter Besant, and John Pounds, a pioneer in ragged school work, were natives of Portsmouth. The house in which Dickens was born is kept as a Dickens museum; p. 249,248.

**Portsmouth**, city, New Hampshire, Rockingham co., on the Piscataqua River. It is the only seaport in the State, and the harbor, deep, and one of the best on the Atlantic Coast, is a port of entry. The town is the birthplace of Thomas Bailey Aldrich and James T. Fields, and was the home of Daniel Webster.

The industrial life of Portsmouth is centered in the United States Navy Yard located on an island in the Piscataqua River. Here the famous *Kearsage* was outfitted before sailing in quest of the *Alabama*. In the Navy Yard is the building in which the peace conference between Japan and Russia was held and the treaty of Sept., 1905, signed (see RUSSO-JAPANESE WAR); p. 14,821.

**Portsmouth**, city, Ohio, county seat of Scioto co., on the Ohio River, at its junction with the Scioto River. It is an important commercial and manufacturing centre, its industrial establishments including iron foundries, shoe factories, brick yards, railroad terminals. The surrounding country is rich in agricultural products, and coal, fire-clay, and sandstone are found in the vicinity; p. 40,466.

**Portsmouth**, city and seaport, Virginia, formerly in Norfolk co., but now independent, on the Elizabeth River, Hampton Roads, opposite Norfolk. Portsmouth is a manufacturing city of some importance. It has a shipbuilding plant, the shops of the Seaboard Air Line, and manufactures of fertilizers, hosiery, lumber, cotton, oil products, copper, paper boxes, berry crates, and pickles. The surrounding country is one of the richest trucking districts in the South, supplying

Northern markets with fruit, berries, and early vegetables; p. 50-745.

**Port Townsend**, city, Washington, county seat of Jefferson co., is situated on Puget Sound, at its junction with the Strait of Juan de Fuca. Three forts, Flagler, Casey, and Worden, equipped with the best modern armament, guard the harbor, which is one of the finest in the world. There is trade in grain, fish, farm and dairy products, livestock, lumber, and oil. The surrounding district is heavily timbered and rich in agricultural produce. Copper, lime, coal, iron, and oil are found in the neighborhood; p. 4,683.

**Portugal**, a small country (republic) on the w. side of the Iberian peninsula. Its area is 35,490 sq. m., including Madeira and the Azores, which form an integral part of the territory.

The surface is divided by the two great rivers which rise in Spain and fall into the Atlantic on the Portuguese coast—the Tagus and the Douro—into three well-marked regions. Portugal has a coast line of over 450 m. and there are several good harbors, the most important being Lisbon, Oporto, Setubal, Lagos, and Villa Nova. While the mineral wealth of Portugal is considerable, lack of coal and poor transportation facilities have prevented the development of valuable mines. The chief minerals found are copper, iron pyrites, lead, iron, tin, coal, wolfram, and sulphur. Large quantities of sea-salt are exported.

*Agriculture, Stock Raising, Fisheries.*—Agriculture is in a backward state, although it is the chief industry of the people. Cattle-raising is carried on extensively in the north, and sheep, goats, and swine are raised in the central and southern parts. Fish are abundant in the rivers and coastal waters, and sardines and tunny fish are largely exported.

*Manufactures.*—Manufacturing is in a low state of development, due chiefly to lack of coal and raw material, and to poor transportation facilities. The large majority of the population is Roman Catholic. Education is poorly organized, and the number of illiterates large. Instruction is divided into three classes, primary, secondary, and higher or special.

The principal Portuguese colonies are Gôa, Macao, and Timor (part) in Asia; and Cape Verde Islands, Portuguese Guinea, the islands of São Thomé and Príncipe, Angola, and Portuguese East Africa in Africa—the total

area being about 936,264 sq. m. and the total population 6,826,000.

Up to 1910 Portugal was a constitutional monarchy, the last king being Manuel II. who succeeded to the throne on the assassination of his father and elder brother in 1908. On Oct. 5, 1910, after a short revolution, a republic was proclaimed, with Théophile Braga as provisional president, and in 1911 a new constitution was adopted. There are two chambers: the National Council with 164 members elected by direct suffrage for three years, and the Second or Upper Chamber, with 71 members, elected by the Municipal Councils and renewable, half at a time, every three years. The two chambers elect the president for four years; and he is ineligible for re-election. The Ministry is appointed by the president and is responsible to Parliament. Cap., Lisbon. The early history of Portugal is pretty nearly that of the peninsula as a whole. The dominant power was Carthage, from the third century B.C. until the country was subjugated by Rome in 138-72 B.C. In the fifth century A.D. the peninsula was overrun by the Alans and Suevi, and later by the Visigoths, and was conquered by the Arabs in 711. Ferdinand of Castile (1033-65) recovered most of the country from them. Before the death of the wise King John, his fourth son, Henry the Navigator (born 1394), had made his country celebrated, not only by the capture of Ceuta, on the n. coast of Africa, in 1415, but by the geographical discoveries which he encouraged, and owing to which the Portuguese possessions were enormously increased. By 1442 Madeira and the Azores were discovered. Trade with the interior of Africa rapidly increased, and the traffic in slaves became immensely profitable to Portugal. In the reign of John II. (1481-95), Bartholomew Diaz (1486) rounded the Cape of Good Hope, and discovered a new route to India, and under his successor, Manuel (1495-1521), Vasco de Gama achieved the passage by sea to India (1497), and Portuguese sailors reached Brazil (1500). When John III. (1521-7) ascended the throne, Portugal was at the height of its fame and prosperity. But the introduction of the Inquisition, with the persecution and expulsion of the Jews, checked the development of the country. After the treaty of Fontainebleau, Napoleon, in order to force Portugal to join his Continental System, sent Junot to take Lisbon. Junot occupied the country, and the Regent

John sailed with all the royal family to Brazil (1807). The consequent French annexation of Portugal was followed in 1808 by the establishment of Joseph Bonaparte at Madrid as king of Spain. But the Spanish people rose, and Britain sent a force under Arthur Wellesley to Portugal in 1808. Thus opened the Peninsular War, which continued till 1814.

For years the throne of Portugal had been tottering. Not even the riches of Portugal's colonial possessions could offset the corruption at home. A strong anti-clerical feeling existed, and Manuel exhibited pro-clerical sympathies. The murder of Professor Bombarda, a well-known Republican and anti-clerical leader, led to open insurrection and on Oct. 4, 1910, Manuel and the Queen Mother fled, first to Gibraltar, then to England; the soldiers pulled down the royal flag, and warships bombarded the royal palace. On Oct. 5 Théophile Braga was chosen provisional president of the Republic. On Oct. 9 Cardinal Netto and about 5,000 monks and nuns were expelled from the country, taking refuge in Spain. On Oct. 18, the Government issued a decree of exile against the Braganza dynasty. In 1911 a new constitution, modelled somewhat upon that of France, was adopted.

The following years, 1920-26, were characterized by continued unrest and disorder. Ministry succeeded ministry. Riots and bomb throwing were a frequent occurrence. In 1926 a dictatorship was established by Gen. Carmona, who was same year chosen President, which office he has held ever since, having been several times re-elected. Portugal's present constitution was adopted in 1934. The legislature is bicameral. There is also a Council of State, a Council of National Defense and a Council of the Colonial Empire. The Premier is given broad powers. Although Portugal strove to preserve her neutrality, the seizure of Portuguese Timor by the Japanese in 1942 threatened to draw her into World War II on the side of the Allies.

**Portugal: Language and Literature**—With the conquest of Southern Spain by Ferdinand III. in the 13th century, and the adoption by Alfonso X. of the Mozarabic dialect, now called Castilian, as the literary language of his realm, the struggle of the Peninsular tongues commenced. Of these, Catalan, Valencian, Galician, and Portuguese managed to hold their own in their respective territories against the newer Castilian speech, which, from the end of the 13th century, dominated

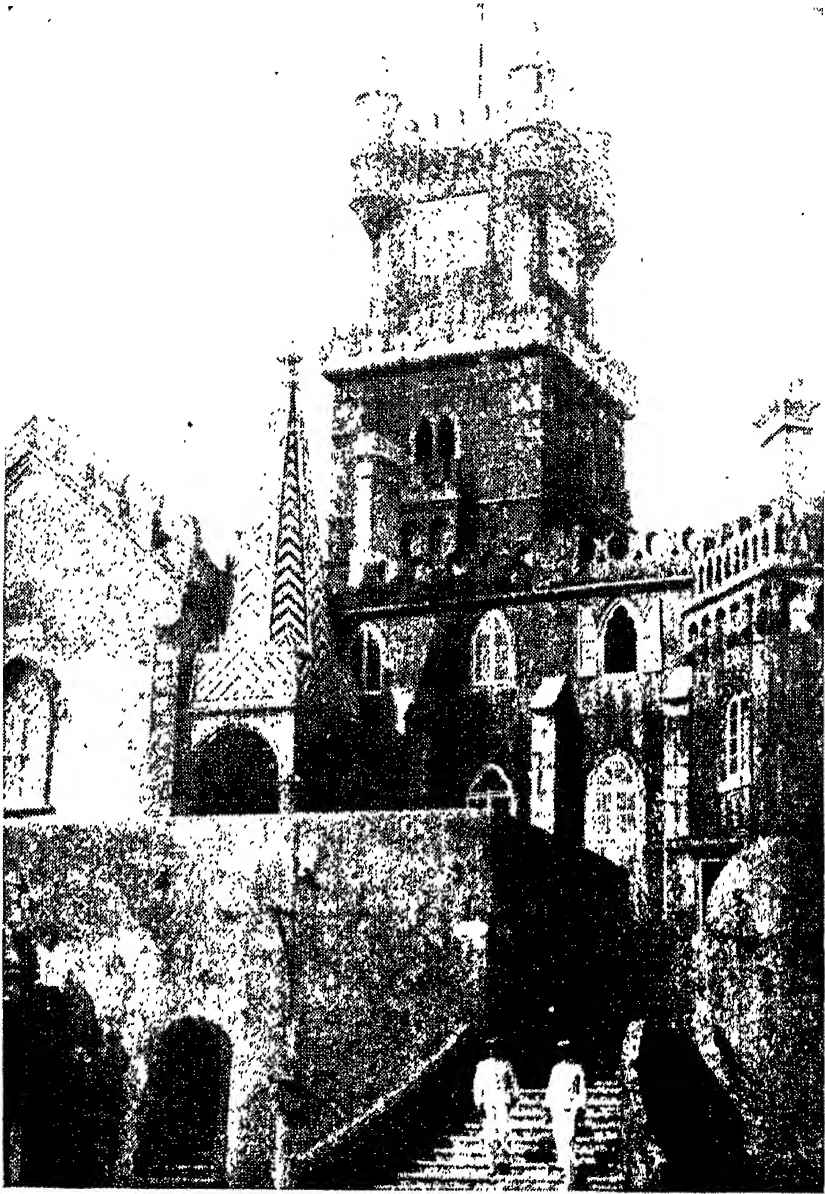
the rest of the Peninsula. It is not too much to say that Diniz did for Portuguese language and letters what Alfonso the Learned did for Spain. He found a chaotic dialect, and he left a cultured language. For the next hundred years poetry flourished in Portugal. It was the poet Sa de Miranda (b. 1495) who did most to modernize Portuguese poetry and drama, though his excessive love for classic and Spanish forms led him to introduce many incorrect idioms. The late 15th and 16th centuries were the golden age of Portuguese literature. As in Spain, the 18th century brought to Portugal a loosening of the old literary fetters under the great reformer Pombal. The wars of the early 19th century checked progress; but after 1853 a great historical revival took place, of which the leaders were Herculano, the Viscount de Santarem, and Rebello da Silva. In poetry and *belles-lettres* the movement was also marked, and the poets Almeida Garrett, Castilho, and Mendez Leal produced work which will live. Portugal has produced of late poets of high rank, such as Palmerim and Soares de Passos; historians worthy to follow Herculano in Luz Suriano, Latino Coelho, and Oliveira Martins; while novelists of the newer school are represented by Eça de Queiroz and other writers of merit.

**Portuguese East Africa**, a dependency of Portugal. Known as Mozambique until 1891, it is now divided into the provinces of Mozambique, Zambesia, and Lorenzo Marques. Total area, about 301,000 sq. m. Around Inhambane sugar, tobacco, tea, coffee, rice, millet, and beans flourish. The low coastlands produce cocoanut and other palms, indigo, tobacco, coffee, and oleaginous plants. The higher lands yield timber. Cereals are grown in the Zambezi delta and the valley of the Busi. On the Lower Zambesi are sugar plantations. The chief exports are sugar, orcs, wax, ivory, maize and raw cotton. In 1919 the Treaty of Versailles allotted to Portugal the territory s. of the Rovuma, known as the Kionga Triangle, formerly a part of German East Africa; p. 4,995,750.

**Portuguese Guinea**, colony of Portugal, on the w. coast of Africa, lying along the Atlantic, between 11° 40' and 12° 40' n. lat. It consists of the low coast and of the Bissagos Archipelago; area, 13,940 sq. m. The principal products are wax, ivory and hides. The capital is Bulama and the chief port Bissão; p. (1940) 426,009.

**Portuguese Man-of-War** (*Physalia*), a genus of Siphonophora. Structurally, it is a





*Lisbon, Portugal: Palácio das Necessidades.*

colony of polyps, whose members show great diversity of labor. The colony consists of an air-sac or vesicle, filled with gas, which projects at the surface of the water, and bears a number of modified polyps on its under side. The commonest species is *P. pelagica*, whose air-sac is a brilliant iridescent blue and whose appendages are both blue and red. If

the tentacles come into contact with human skin their stinging cells produce a burning sensation which in some cases may have serious effects.

**Port Wine**, a pale red to a very dark red or even violet-colored wine, produced from special vines grown on the s. and southwest mountain slopes of the Douro valley in Port-

ugal, and in northeastern Spain around Catalonia. Port is a rich, heavy wine, of from 18 to 25 per cent. alcoholic content, which owes its strong characteristics partly to soil, but largely to climate.

**Poseidon**, in ancient Grecian mythology, the god of the sea, was a son of Cronus and Rhea, and brother of Zeus and Pluto. He is closely connected with the horse, which he is said to have created. Earthquakes were attributed to his agency, and he caused, controlled, and calmed the storms of the sea.

**Posen** or **Poznan**, city, Poland. chief tn. of the co. of Posen, on the river Warthe; 175 miles w. of Warsaw. It is a strongly fortified town and is industrially important. Since the Great War the town has been completely transformed from a German to a Polish city. Agricultural implements, machinery, liqueurs, beer, and cigars are the principal products. In 1793 it was annexed to Prussia and at the close of the Great War it was restored to Poland; p. 269,000.

**Positivism**, the school of philosophical thought founded by Comte. It was the ultimate aim of Comte's philosophy to lay the foundations of a comprehensive social reconstruction. For Comte himself this work of social reorganization was to be completed by the institution of a new religious system. But into this religious development of Comte's philosophy a number of his disciples, headed by Littré, refused to follow him. On this issue the school divided; so that positivism has a double meaning, according as we include or exclude the religious part of the founder's work.

**Possession, Legal**, the relation in which a person stands to a thing when the law attributes to him the advantages or legal incidents of possession, whether he is apparently in physical possession or not. Legal possession generally includes physical possession, but not always; and physical may exist without legal possession. For example, a man may leave his house unoccupied to go to business, and when he returns find an intruder in it, but the owner has not thereby lost legal possession, and has the right to forcibly eject the trespasser. However, if one loses his umbrella, he has lost legal possession and he must bring an action to recover it from the finder. Possession gives a good title to property against all but the true owner—a rule which has important consequences in connection with lost property, unclaimed bank balances, and the like. Under the statutes of limitation, in most states adverse

possession of real property for a long period, usually twenty years, gives a person absolute title.

**Post, George Browne** (1837-1913). American architect, was born in New York City. He engaged in architecture in New York, becoming one of the leading architects of his day, and the designer of many of the important buildings of his native city, including the original Equitable Building, the Stock Exchange, Produce Exchange, Cotton Exchange, Pulitzer Building, Western Union Building, Mills Building, City College group, New York Hospital, and the residence of Cornelius Vanderbilt formerly at 57th Street and Fifth Avenue.

**Post, Melville Davisson** (1871-1930). American author and lawyer, was born in Harrison County, W. Va. Among his published works are *The Corrector of Destinies* (1909); *The Gilded Chair* (1910); *The Sleuth of St. James Square* (1920); *Walker of the Secret Service* (1925); *The Man Hunters* (1926); *The Revolt of the Birds* (1927); besides numerous short stories and magazine articles.

**Post, Wiley** (1899-1935). round-the-world flyer who was killed when his airplane crashed near Point Barrow, Alaska, on August 15, 1935, while on a vacation trip with Will Rogers, the humorist, who also lost his life. On June 23, 1931, he and Harold Gatty took off from Roosevelt Field, Long Island, on the globe-girdling flight which brought them fame. They completed the trip in eight days, fifteen hours and 51 minutes. Post equipped his plane, the Winnie Mae, with a robot pilot and made the same trip alone in 1933, lowering the time of the previous flight and establishing a record for the New York-Berlin leg—twenty-five hours and forty-five minutes.

**Postage Stamps**, printed labels fixed to letters, parcels, or other mailable matter to indicate the prepayment of postage. In the United States the first stamps were issued by individual postmasters at their own expense in 1845, but these were superseded in 1847 by the first Government issue. The manufacture of U. S. postage stamps is carried on by the Bureau of Engraving and Printing. The collecting of postage stamps, known as *Philately* or *Timbrology*, has a wide vogue.

**Postal Savings Banks**, a system of savings banks established by government authority and conducted through the Post Office Department. Postal savings in the United States date from 1910, when Congress authorized the establishment of postal sav-

ings depository offices, and created a board of trustees, consisting of the Postmaster General, the Secretary of the Treasury, and the Attorney General, with power to designate such post offices as they might select to be depository offices, and to have supervision and control of the same. The Act provides that any person of the age of ten years or over may, in his or her own name, open an account in any postal savings bank depository; but no person can have more than one account in his or her own right. Accounts may be opened by the deposit of a dollar or a larger sum in multiples of a dollar, or by purchasing a postal savings card for 10 cents and affixing thereto, at convenience, nine specially prepared postal savings stamps costing 10 cents each. In 1941 there were about 3,000,000 depositors.

**Posters**, advertising sheets of considerable size, usually printed and often illustrated, and bearing large letters so that when posted on a wall, or any similar spot, they may easily be read. Poster work in the United States had its origin in the old circus and theatrical show bills printed from wooden blocks. The use of the lithographic stone was introduced in the early '80's, but it was not until after 1890 that modern poster work took its rise in this country with the development of such poster artists as Maxfield Parrish, Louis Rhead, Will H. Bradley, Edward Penfield, Ethel Reed, J. C. Leyendecker, Will H. Low, George Wharton Edwards, and others. Posters are not now as noticeable in the United States as they were some years ago; but the poster character of design is introduced far more extensively in advertising and cover reproduction, even entering the field of illustration.

**Post Impressionism**, a name given to the art development following Impressionism and representing not a continuation but a reaction from the former movement. It combats the attitude that art is a matter of imitation, and holds rather that its chief concern is creation; that its aim, as has been said, is 'not at illusion, but at reality.' Among the acknowledged leaders of the movement are Cézanne, formerly associated with the Impressionists, Gauguin, Van Gogh, and Matisse. Of the various manifestations of Post Impressionism the two which have attracted the greatest attention are Cubism and Futurism.

**Post Mortem**, or **Autopsy**, an examination after death to ascertain the condition of the various parts of the body, to note any changes in the organs, and to determine,

as far as possible, the cause of such changes.

**Post Office**, a government service designed primarily for the despatch of written communications, but comprising in modern times a number of other services, as the transmission of merchandise and of printed matter, postal savings banks, the issue of money orders, and in some countries telegraph and telephone facilities. In America the first step in the establishment of a postal system was the appointment by the General Court of Massachusetts, in 1639, of an official to take charge of the delivery of letters.

Under the Constitution, a postal service was authorized by Congress in 1789, and Samuel Osgood became the first Postmaster-General of the new station, the office being subordinate to the Treasury Department. Seventy-five local post offices were in existence at that time, and the mails were carried on 1,875 miles of road at an annual cost of less than \$25,000. In 1836 the postal service was reorganized on its present financial basis. In 1847 the use of postage stamps was officially authorized; and in the same year the first postal treaty with a foreign government was concluded with Bremen, then an autonomous German state.

On the basis of receipts, post offices are divided into four classes, as follows: first class offices, with gross receipts exceeding \$40,000 per annum; second class, with receipts from \$8,000 to \$40,000; third class, from \$1,500 to \$8,000; and fourth class, less than \$1,500. Postmasters in the first three classes are appointed by the President with the advice and consent of the Senate. Fourth class postmasters are appointed by the Postmaster-General, those receiving annual compensation of \$500 or over being appointed after competitive examination, and the others on the recommendation of the post office inspectors after personal investigation. Clerks and letter carriers in places where free delivery exists, assistant postmasters at first and second class offices, and all clerical positions at the same offices are subject to civil service rules.

**Railway Mail Service.**—Mail was first carried by rail in 1834, but the railway mail service, providing facilities for the separation and distribution of mail on the cars while in motion, dates from 1864, when George B. Armstrong of Chicago opened the first railway post office in the United States on the Chicago and Northwestern Railway, from Chicago to Clinton, Ia. The experiment proving successful, the system was rapidly extended to other lines, and in 1875 the fast mail service was inaugurated. **Air Mail.**—A daily transcontinental air

mail service is carried on between New York and San Francisco. Postage is charged on a three-zone basis. *Free Delivery* was inaugurated in cities on a small scale in 1863, and was gradually extended until in 1887 it was made allowable in every city of 10,000 or more, or at any post office having a gross revenue of \$10,000. *Rural free delivery* was begun on an experimental scale in 1896, and has been extended continuously among the rural population. *Postal Rates*.—All mailable matter is divided into four classes, and rates are fixed accordingly. *First Class Matter* consists of letters and other matter wholly or partly in writing, as well as all matter sealed or otherwise closed against inspection.

*Second Class Matter* embraces all newspapers and other periodical publications fulfilling certain statute requirements and duly entered as second class matter. *Third Class Matter* comprises printed matter other than newspapers and periodicals admitted to the second class and merchandise not exceeding 8 ounces in weight. *Fourth Class Matter—Parcel Post*.—Until Jan. 1, 1913, merchandise was carried at the rate of 1 cent an ounce, the weight limit being 4 pounds. Since that date it has been reorganized under parcel post regulations. Fourth class matter, under the 1925 regulations, embraces all matter weighing over eight ounces not included in the first, second, or third class, not exceeding 50 lbs. in weight (70 lbs. in the first, second, and third zones), nor greater in size than 89 inches in length and girth combined.

At the head of the U. S. Post Office Department is the Postmaster-General. To his office are attached the Chief Clerk, Superintendent of Post Office Department Buildings, appointment and disbursing clerks, Solicitor for the department, Purchasing Agent, and the division of post office inspectors under the Chief Inspector. There are four assistant postmasters-general. Closely affiliated with the Post Office Department, though an officer of the Treasury Department, is the Comptroller for the department, in whose office the accounts of postmasters are received and audited, and all money order accounts are examined.

**Postulate**, a term brought into philosophical use by Kant, who used it to express assumptions implied in morality, but not capable of theoretical demonstrations—*viz.*, the existence of free agents, the immortality of the soul, and the existence of God as a moral governor. By Kant himself these moral postulates were, on the one hand, carefully distinguished from theoretical principles and hy-

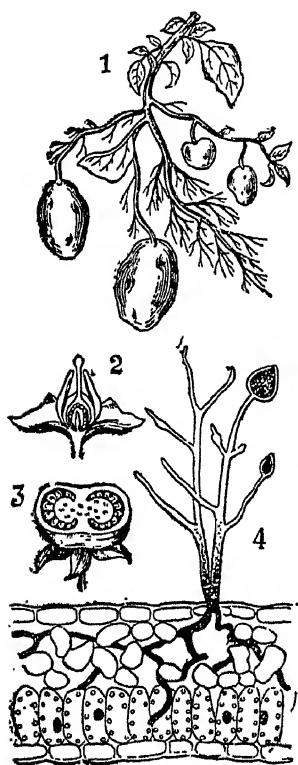
potheses; and on the other, admitted only as the warrant of an objective moral necessity. We believe in free will, not merely because we wish to do so, but because as moral agents we must. But the conception has come to be used especially by writers on the doctrine of pragmatism, without any regard to these limitations.

**Potassium** (K, 39.10), one of the alkaline metals, first isolated by Sir Humphry Davy in 1807, and the first metal to be isolated from an earth by the electric current. The importance to the world of the potassium supply may be judged from an enumeration of the wide uses to which its salts—commonly known as potash—are put. Not only do the potash salts form an essential ingredient of all commercial fertilizers, but a large amount is used in glass and soap making and in the manufacture of numerous chemical products. Potassium never occurs free in nature, although it is present in fertile soils, from which it is extracted by plants. In combination, usually as the chloride, sulphate, and carbonate, it is found in sea water, in many minerals (micas and feldspars), as an incrustation of the soil, and in vegetable and animal substances. Before the beginning of the Great War (1914), practically the world's entire supply of potash salts came from the mines of Stassfurt in Prussian Saxony.

In 1909-10 the German-American potash war first awakened American interests to the fact that they were dependent on Germany for this most important product; and with the complete cutting off of this main source of supply by the war, the U. S. Geological Survey redoubled its efforts to discover new sources in the United States. California is by far the greatest producer, with Maryland second, but far behind. The discovery of potash in Western Texas in 1912 has led to the centering of interest in that region as a probable future commercial source of natural salts of potash. The following are the chief compounds of potassium: *Potassium hydroxide*, also known as *Caustic Potash*, KOH, is formed by the action of the metal on water and the electrolysis of potassium salts, and prepared commercially by boiling potassium carbonate with milk of lime and evaporating the clear solution till it solidifies on cooling.

*Potassium carbonate*, or *Potashes*,  $K_2CO_3$ , may be prepared as in the black ash process for obtaining sodium carbonate, but is mainly obtained from wood ashes and beet root residue. *Potassium nitrate*, *Nitre*, or *Salpetre*,  $KNO_3$ , is chiefly obtained by the interaction of

potassium chloride from Stassfurt with the sodium nitrate of the Peruvian deposits. *Potassium chlorate*,  $\text{KClO}_3$ , is obtained by the action of excess of chlorine on a hot solution of caustic potash ( $6\text{KOH} + 3\text{Cl}_2 = 5\text{KCl} + \text{KClO}_3 + 3\text{H}_2\text{O}$ ), or indirectly through the corresponding calcium compound prepared in a similar way. *Potassium cyanide*, for which the sodium compound is now largely substituted, is a white fusible salt that is soluble in water and is intensely poisonous. *Potassium chloride*,  $\text{KCl}$ , known commercially as *Muriate of Potash*, closely resembles common salt, and has been largely obtained from the deposits at Stassfurt.



Potato

1. Potato plant—leaves, roots, underground stems with tubers showing 'eyes'; 2. flower, section; 3. fruit, section; 4. section of leaf, greatly enlarged, showing the fungus *Phytophthora infestans*, which gives rise to late blight.

**Potato**, the edible farinaceous tuber of a native American perennial (*Solanum tuberosum*), one of the most widely cultivated of agricultural plants, and next to the principal cereals the most valuable as a source of human

food. It came originally from South America; was introduced into North America and Europe in the 16th century; and by the latter half of the 18th was recognized as a staple crop in the temperate regions of both continents. The potato thrives best in a rich, sandy loam abundantly supplied with organic matter, and naturally well drained. Potatoes are grown primarily as a food crop, but are of importance as a source of starch, especially for sizing paper and textiles. They are used also as a source of industrial alcohol in Europe, as a stock food, and in the manufacture of potato flour and glucose. The potato is subject to a number of diseases, some of which are at times the cause of serious loss. *Early Blight* or *Potato Leaf Blight* is a widespread and destructive disease due to the fungus *Alternaria solani*.

*Late Blight*, known also as *Potato Disease* and *Potato Blight*, is especially prevalent in damp, dull weather and in moist or wet soil. It is due to the fungus *Phytophthora infestans*, and is much more destructive in European countries than in America. *Wilt* or *Brown Rot*, especially troublesome in the southern United States, is caused by the *Barillus solanacearum*, and may be recognized by the sudden wilting of the vines and the browning of the vascular bundles in the tubers, followed by rotting. *Potato Scab* is due to a soil fungus, *Oospora scabies*, which causes rough irregular blotches on the tubers sometimes covering the entire surface. The most serious insect pest of the potato is the *Colorado Potato Beetle*, or *Potato Bug* (*Leptinotarsa decemlineata*), a leaf-eating insect native to the Rocky Mountain region, whence it has spread eastward to the Atlantic Ocean. Another serious insect pest is the *Flea Beetle* (*Epitrix cucumeris*), a tiny black insect, about one-sixteenth of an inch in length, which feeds upon the leaves of the young plants.

**Potemkin, Gregory Alexandrovitch, Prince** (1739-91), Russian statesman, member of a Polish family, was born near Smolensk. During the short reign of Peter III. he and the Orloffs plotted with Peter's wife, Catherine, to bring about the abdication of the Tsar and the accession of Catherine. In 1776 he became the acknowledged favorite of the Tsaritsa and from that time till his death he guided the foreign policy of Russia.

**Potential**, a function of fundamental importance in the theory of attractions, and also, by a mathematical extension of meaning, in hydrodynamics. It is a function of the position of a point, its value depending upon the attracting matter which acts upon unit mass

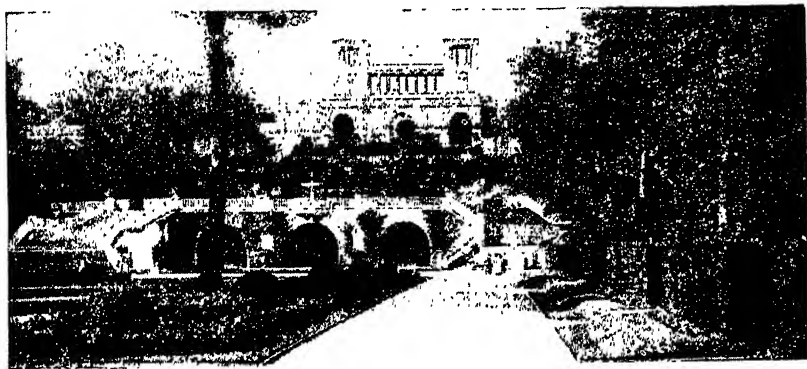
supposed to be placed at the point. Once the function is known, we obtain the force in any direction at the point of calculating the rate of change of the potential in that direction. Thus we arrive at the conception of what are called equipotential surfaces, which are at every point perpendicular to the force at the point. The general mathematical conception of a potential function is that it is a function whose rates of change along any three chosen perpendicular directions give the components in those directions of an important directed quantity, such as a force in attractions or a velocity in fluid motion.

**Potentilla**, a genus of mostly perennial herbs and shrubs belonging to the order Rosaceae. They usually bear corymbose cymes of white or yellow flowers with a ten-cleft calyx

Virginia and Virginia on the s. and w., and empties into Chesapeake Bay. The scenery of the upper Potomac is picturesque, but is marred by the yellow color of the water. It is about 400 m. long and its chief tributaries are the Shenandoah, the largest, the Cacapon, the Monocacy, and Bull Run.

**Potosi**, town, Bolivia, on the flank of Cerro de Potosi (15,724 ft.); 50 m. s.w. of Sucre. The leading industry is mining but the once famous silver mines have greatly decreased in output, though still profitable.

**Potsdam**, city, Prussia, capital of Brandenburg province; 16 m. s.w. of Berlin. It is beautifully situated on an island in the Havel River which here expands into a series of lakes. It is chiefly celebrated for the royal palace erected and adorned by Frederick the



Potsdam, Germany: Orangerie at Sans Souci.

in two rows, five petals, and numerous stamens. Among the species are the common *P. canadensis*, the cinquefoil, a trailing, early-flowered plant.

**Potenza**, town, Italy, capital of Potenza province; 93 m. n.w. of Taranto. It has a cathedral and a small museum. In 1857 nearly the entire town was destroyed by an earthquake; p. 23,738.

**Pot-holes**, circular depressions in the channel of rivers where they flow rapidly over bare rock. They may be a few inches or several feet across, and at the bottom there are usually a few pebbles.

**Potidæa**, ancient Greek city, founded by a colony from Corinth about 600 B.C., on the isthmus of Pallene, s. of Macedonia. At the end of the 4th century B.C. Cassander built a new city on the site, called Cassandria, which became the most prosperous city in Macedonia.

**Potomac River**, an important river in the United States which forms the boundary between Maryland on the n. and e. and West

Great; the Babelsberg palace in English Gothic style, erected in 1843-9, where Emperor William I. spent his summers; p. 65,795.

**Potsdam Beds**, The, comprise the Upper Cambrian rocks of North America, and include the Olenus fauna. They are developed about Lake Champlain, in the Adirondacks, and in the St. Lawrence valley.

**Potsdam Conference**. See U. S. United Nations Conferences.

**Pottawatamies**, a tribe of North American Indians, a western branch of the Algonquian stock, who formerly ranged round the southern shore of Lake Michigan.

**Potter, Edward Clark** (1857-1923), American sculptor, was born in New London, Conn. He collaborated with D. C. French in sculpture for the Chicago Exposition, and executed statues of General Grant, Washington, Hooker, De Soto and others. Other works include groups at the Buffalo Exposition and in the Morgan Library, New York City.

**Potter, Cora Urquhart** (1859-1936), Am-

erican actress. During the Boer War (1899-1902) she was active in raising funds to buy and equip the American hospital ship *Maine* which was sent out to the Cape, and in 1910 she toured as Jacqueline in *Madame X*.

**Potter, Henry Codman** (1835-1908), American clergyman. In 1883 he was consecrated coadjutor bishop to his uncle, Horatio Potter, Bishop of New York, succeeding the latter as bishop on his death in 1887. During his bishopric was the beginning of the erection of the Cathedral of St. John the Divine in New York City.

**Potter, Paul Meredith** (1853-1921), playwright, born in Brighton, England. His first accepted play was *The City Directory* (1889). Then followed *The Ugly Duckling* (1890); *The World's Fair* (1891); *The American Minister* (1892), and *Trilby* (1895).

**Potter's Earth**, or **Pipeclay**, a white clay consisting chiefly of kaolinite,  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$ , used for making tobacco pipes, and white pottery.

**Potter's Field**, the name given to the burial place of those who die alone and penniless.

**Pottery or Ceramics**, a term used to designate a large class of objects, both useful and ornamental, fashioned of some variety of clay when moist and plastic, and then fired. It is one of the oldest branches of human industry. Probably the earliest home of the ceramic art is to be found in Egypt where excavation has discovered specimens of pottery said to have been fashioned as far back as the 20th century B.C. The history of the art in Greece shows a remarkable and rapid development from the crude productions of prehistoric times to the exquisite beauty of the work of the 4th century B.C.

In the East, notably China and Japan, ceramics have always held an important place. Among the products of European countries several stand out prominently for their beauty and artistic merit. Thus we have the gray, blue, and white delft of Holland, the famous porcelain of Sèvres and Limoges in France, the Dresden and Royal Berlin porcelain of Germany, the Royal Copenhagen, and Rorstrand porcelains of Denmark and Sweden respectively, and the Wedgwood, Crown Derby, Royal Worcester and Lowestoft porcelains of England. The Incas of Peru and the natives of Mexico have left us the most beautiful and ingenious specimens, showing that among these tribes the ceramic art had known great development. Many of the objects left by the Aztecs were elaborate-

ly modelled and profusely decorated. The settlers in New England and the Southern States found the pottery of the nomadic tribes in possession very coarse and fragile. About 1612 brick making was started in the United States and about 1734 a stoneware factory was established in New York. In the latter part of the 18th century German potters in Pennsylvania began the manufacture of terra cotta roofing tiles and earthenware. In 1825 a successful factory for hard porcelain was opened in Philadelphia. Stoneware for domestic purposes is manufactured in enormous quantities in Ohio and Indiana, largely from local materials which are so abundant in those two States. Most of the whiteware and porcelain produced in the United States is for table and toilet purposes, and while there are a number of factories scattered over the States east of the Mississippi, the two great pottery centers are Trenton, N.J., and East Liverpool, Ohio. Not a little Belleek porcelain, however, is made in Trenton.

In recent time a number of potters have devoted attention to the development of wares having artistic value. Of these the Rockwood Pottery of Cincinnati has achieved great success. Many art potteries have specialized in the development of opaque mat glazes of green, blue, and other colors, such as are seen in the Grueby, Teco, and Van Briggie ware. Other decorative and artistic pottery is the Aurelian, Louwelsa, Eocene, and Sicardo ware of the Weller pottery at Zanesville, O.; the copper-red Rozane pottery of the Roseville pottery; in the *sang de boeuf* and crackle ware of the Dedham pottery at Dedham, Mass.; the original and beautiful ware produced by the Newcombe Memorial College, New Orleans; and the Robineau ware of Syracuse, N.Y.

The raw material used is clay, but it is clay of varying quality and to which other substances are frequently added. Cornish clay, or kaolin, a creamy white, plastic substance, forms the main body of porcelain everywhere. Glazes are specially composed glasses, ground fine in water and spread over the ware to be fused at a second baking in the oven. In some cases the decorations, if such there be, are under the glaze, in others, over it. There are two chief glazes, lead and salt. The modern glazes are generally transparent silicates of alumina, compounds of Cornish china (kaolin), flint, and white lead, with borax and alkalis added as a flux. The steps common to all grades of ware are: preparation, tempering,

moulding, drying, and firing. The care of preparation increases as the grade of the ware rises, and in glazed wares a second firing is also necessary if the body must be burned before the glaze is applied.

**Firing** is the final and most important step in the making of pottery for on it depends much of the quality of the resulting object. Pottery kilns are of three general classes: biscuit, glost, and enamel. The biscuit kilns are those in which the clay is changed to 'biscuit.' They reach a very high temperature, from 2,000 to 2,500° F. The glost or glazing kiln is similar in construction to the biscuit kiln, but usually smaller and the heat is less intense. Whiteware and porcelain are often elaborately decorated, either under or over the glaze, but the style of decoration most often seen is printwork. Modern ceramics, from 1935 to 1937, has been confined for the most part to work on china. The Japanese have reproduced many of the old shapes and patterns still popular in cheap wares, and American producers of quality china have put on the market fine earthenware, and porcelain dishes with decorations simple even to the point of austerity.

It is notable that porcelain has a hardness most easily discernible. The modern china contains bone ash, ironstone and feldspar (introduced by Spode).

A name of great importance in American ceramics today is that of the Walter S. Lenox organization which still carries on the traditions of the Mintons, Spodes and others renowned in American pottery.

Figurines are popular for decoration today. Ceramists are using a wider range of animals than ever before and the classes of human figures and groups are nearly endless including the interpretive element of humor and the visible influence of athletics. These figurines are sculptured in metal, wood, plaster and porcelain glazed as finely as china.

Some of the outstanding ceramists are: Wayland Gregory and Genevieve Thomas; and prominent among the Germans is Rudolph Struck.

Gayety and abundant decorative sense—typical of modern things originating on the European continent—make it comparatively easy to identify the influence of Austrian and French artists on many of the modern American figurines. There are, however, many in the American field today whose art is alive with a freshness and an originality that make it really important and individual.

**Pottstown**, borough, Pennsylvania, in Montgomery co., on the Schuylkill River, 40 m. n.w. of Philadelphia. It is an important manufacturing center, the production of iron and steel goods being especially large. Other products are agricultural implements, silk, hosiery and bricks; p. 24,530.

**Pottsville**, city, Pennsylvania, county seat of Schuylkill co., on the Schuylkill River. Industries include the manufacture of structural steel, iron, lumber, furniture, shoes, textiles, and clothing. The district contains extensive deposits of anthracite; p. 20,194.

**Poughkeepsie**, city, New York, county seat of Dutchess co., on the e. bank of the Hudson River, 75 m. n. of New York City. It is the seat of Vassar College. There are manufactures of mowing and reaping machines, cream separators, horseshoes, knit goods, underwear, shoes, shirts, cigars, automobile accessories, hardware, trousseaus, dyes, cough drops, chairs, buttons, etc.; p. 40,478.

**Poulsen, Valdemar** (1869-1942), Danish inventor. He devised (1900) the telegraphone, an apparatus for magnetically recording telephone conversations and discovered the Poulsen arc and the Poulsen wave upon which the Poulsen system of wireless telegraphy is based. See WIRELESS TELEGRAPHY.

**Poulson, Niels** (1843-1911), manufacturer and philanthropist, was born in Denmark, and went to America, where he formed a partnership with Charles M. Eger, and in 1897 the firm was incorporated as the Hecla Iron Works. He gave \$100,000 for the purpose of exchanging lectures and students between the United States and Scandinavia. His fortune of \$500,000 was left to the same cause.

**Poultice**, or **Cataplasma**, any soft, moist pultaceous mass employed for the external application of moist heat to the body. The effect of a poultice is to produce dilatation of the blood-vessels where it is applied, and so to relieve congestion, pressure, and pain.

**Poultry and Poultry Farming.** The word poultry is a general term for that group of domestic birds which includes the ordinary domestic fowl, the turkey, guinea fowl, peafowl, pheasant, duck, and goose. It does not include pigeons or cage birds. The birds of the poultry group are of economic value for their flesh and eggs, which are among the most valuable of foods. The most important of the birds of the poultry group, economically, is the ordinary domestic fowl, or chicken. **Domestic Fowl.**—The most popular general purpose breeds of domestic fowl, i.e., breeds which are adapted both to egg production



and to table purposes, are the Plymouth Rock, Wyandotte, Orpington, and Rhode Island Red. The favorite American breed is the *Plymouth Rock*.

Meat fowls are heavier and larger than either the egg or general-purpose breeds. They are persistent sitters but indifferent layers. The eggs are large and brown shelled. Standard breeds are the *Brahma*, *Cochin*, *Cornish*, *Langshan*, and *Dorking*. In addition to the



*Courtesy Lenox Inc., Trenton, N. J.*  
*Modeling Clay.*

classes mentioned, there are a number of purely ornamental breeds, including *Silbies*, *Sultans*, *Frizzles*, and *Bantams*. Duck Raising on a large scale has been developed in the United States to a considerable extent on Long Island and in sections within easy distance of the larger eastern cities. Turkey Raising is ordinarily engaged in as a side line by the general farmer. The most popular breed is the Bronze, after which come the White Holland, Bourbon, Red, Black, Narragansett, and Slate.

**Pound**, an enclosure for the reception and detention of animals taken while straying on the highways, or trespassing and doing damage on private property.

**Pound, Ezra** (1885- ), American poet was born in Hailey, Idaho. In 1914 he became literary executor for Ernest Fenollosa, the American orientalist, and did constructive work on the Japanese Noh drama and on Chinese and Japanese poetry. He was London editor of *The Little Review* (1917-19), and published a number of collections of poems—*Personae* (1909); *Exultations* (1909); *Canzoni* (1911); *Ripostes* (1912); *Cathay* (1915); *Lustra* (1916); *Quia Pauper Amavi* (1919); *Poems* (1921); *Cantos* (1925, 1928,

1933, 1940). His works and translations include *Noh or Accomplishment* (1917); *Letters of John Butler Yeats* (ed. 1917); *Indulgences* (1920); *Indiscretions* (1923).

**Pound, Roscoe** (1870- ), American educator, was born in Lincoln, Neb. He was professor of law at Northwestern University (1907-09), and at the University of Chicago (1909-10); and Story professor of law (1910-13), Carter professor of jurisprudence (1913- ); and dean of the Law School (1916-1930), at Harvard University. His published works include various textbooks on law; *Law and Morals* (1924); and *Criminal Justice in America* (1930).

**Pound Sterling**, the British monetary unit, was originally an actual pound weight of silver of 5,760 grains of a certain standard of fineness (925 in 1,000).

**Poussin, Nicolas** (1593-1665), French classical landscape and figure painter, was born in Les Andelys, Normandy. He was court painter to Louis XIII. from 1640 to 1642, but thereafter went to Rome, where he spent the rest of his life. His paintings are to be seen in Rome, in the Louvre, in the National and Dulwich Galleries and the Wallace Collection, London, and in other European galleries.



*Major-General Baden-Powell*  
(Photo by Elliott & Fry.)

**Powderly, Terrence Vincent** (1849-1924), American labor leader, born in Carbon-dale, Pa. In 1897 President McKinley appointed him U. S. commissioner-general of immigration, which office he retained until 1902. He was admitted to the bar of the Supreme Court of the United States in 1901. In 1906 he was appointed a special agent, Department



*Breeds of Poultry.*

1, Plymouth Rock; 2, Partridge Cochins; 3, Light Brahma; 4, Modern Game; 5, Indian Game; 6, Brown Leghorn; 7, Buff Orpington; 8, Silver Dorking.

of Commerce and Labor, to study causes of European emigration, and in 1907 chief of division of information, Bureau of Immigration.

**Powell, John Wesley** (1834-1902), American geologist, was born in Mount Morris, N. Y. He was professor of geology in the Illinois Wesleyan University (1865-8), and successfully explored the Grand Cañon of the Colorado (1868-9). In 1881 he succeeded Clarence King as director of the U. S. Geological Survey, but was compelled by ill-health to resign the position in 1894. In 1900 he conducted an exploring expedition to Cuba to study prehistoric remains there.

**Powell, Maud** (1868-1920), American violinist, was born in Peru, Ill. For 20 years she devoted herself to concert playing with the most important orchestras of the country, taking rank as the foremost woman violinist of America. In 1892 she accompanied the Arion Society of New York upon a tour to Germany, and afterwards made successful professional visits to England, Germany, Russia, Denmark, and South Africa.

**Powell, Sir Robert Stephenson Smyth Baden** (1857-1941), British general, entered the army in 1876. During the Boer War (1899) he was in command of the small force which held Mafeking for 215 days against a large besieging army, and in recognition of this accomplishment was promoted major-general. In 1908 he founded the organization of Boy Scouts and Girl Guides to promote good citizenship in the rising generation.

**Power or Power of Appointment**, in law, an independent authority vested in one or more persons to alienate or encumber lands irrespective of the ownership thereof. Such authority must be derived from the present or a former owner of the lands subject thereto, and it may be conferred on the person in whom an estate in the lands is vested, or, as is more frequently the case, upon one who has no interest whatsoever in the lands. Powers are frequently employed both in England and in America to vest a power of sale or devise in a life tenant, or a power of sale in executors in the settlement of estates. In several States of the United States they are wholly regulated by statute.

**Power Development.** The supremacy of the United States in national wealth and productive capacity is primarily due to the intensive exploitation of its resources, its labor-saving machinery, and its sources of power. Its high scale of production in agriculture, mining, and manufacturing must, therefore,

be credited in a large measure to the extensive use of power-driven machinery.

Aside from the attempts to utilize the direct radiation of the sun, the use of the wind-mill, tide mill, and wave motor, and the recent generation of steam in pipes sunk into the ground in volcanic regions, the world's supply of power is dependent upon the chemical storage of the sun's energy in the form of coal, oil and natural gas, and wood, and the potential energy of water impounded above sea level. Among the latter common sources of energy the most abundant supply is found in the coal deposits. The heat of combustion of coal, most of which is supplied by the carbon content, may be utilized to develop steam pressure in a boiler, and the steam in turn may be made to drive a steam engine or turbine and produce mechanical power. Unfortunately, the distribution of the coal deposits is not uniform over the United States, the most extensive area of high-grade coal existing for the most part east of the Mississippi River. This fact is intimately connected with many problems of power development.

In some remote geologic age another form of organic matter, possibly of the animal kingdom, became sealed up in the crust of the earth and in the course of time became converted into oil and natural gas. Oil contains an even greater amount of energy per pound than coal. It may be burned under boilers to produce steam for engines or turbines and possesses the further advantage over coal of being more easily handled and controlled. By mixing air with the lighter grades of distilled oil a combustible gas is formed which may be exploded by electric ignition in the cylinders of an internal combustion engine, with high efficiency. This type of engine as designed for automobile and airplane service possesses the important property of developing more power per unit weight of engine than any other type of prime mover. The Diesel engine, which is adapted only to stationary power plants, may be operated with crude oil or even with the residue of crude oil after the lighter constituents of the oil have been abstracted for other important purposes.

While the use of Diesel engines on land or ship power plants not exceeding a few thousand horsepower in capacity is at present desirable in the economic sense, and the internal combustion engine utilizing gasoline as a fuel is now unsurpassed for automobile, tractor, and airplane service, the continued use of oil in these developments depends seriously upon the relationship of the supply to the future

demand for the oil. There is a prevalent idea that hydraulic power may be developed in the future to such an extent as eventually to displace the present major use of coal and oil as a source of energy. The late Dr. Steinmetz made a comprehensive study of this possibility and demonstrated with certainty that no such substitution could be expected. If the equivalent of natural gas and oil is included in the estimate, the annual consumption of coal in the United States at present is nearly one billion tons.

The annual potential energy of the water powers of the United States, determined by multiplying the average height of the land above sea level by the average annual rainfall, gives a value of approximately one billion kilowatt-years or the power of one billion kilowatts developed continuously throughout one year. Much of this rainfall must be utilized, however, for agricultural purposes, and a considerable portion of it is lost for power purposes by seepage into the ground and evaporation into the air, so that according to Steinmetz, not more than 20 per cent. of the theoretical total supply, or 200 million kilowatt-years, could be utilized for power development. Since one ton of coal contains about one kilowatt-year of energy it is obvious that the energy equivalent of the present annual coal and oil consumption is five times greater than the total possible amount of energy available each year from all sources of hydraulic power. Another factor which opposes the general use of hydraulic power is that it is not adapted to the operation of most portable conveyances.

From this survey of our resources in energy it will be seen that the nation must depend primarily upon its deposits of coal. Hydro-electric power will be developed and utilized most effectively on the Pacific Coast where coal is scarce and hydraulic power is abundant. It has been estimated that the available hydraulic power of the western States is six times greater than the total power demand of that region for all purposes. The bituminous coal resources in the middle-western and eastern part of the country are so great that their depletion at the present rate of consumption is not expected for many centuries. One careful estimate indicates that the coal supply will last for 4,000 years. The future power supply in the United States is evidently dependent upon the construction of larger and more efficient steam-electric power stations supplemented by hydro-electric power stations wherever a source of hydraulic power can be

economically utilized. Present practice favors the location of the steam-electric plant on tide-water, lake, or river, in the general vicinity of the region where the major portion of the power is consumed.

Thoughtful consideration has recently been given to the question of safeguarding the continuity of service of the existing electric transmission systems which have grown to such an extent that millions of people distributed over a large area are dependent upon a single system for their supply of power. These systems are usually supplied by several power plants operated by steam or a combination of steam and hydraulic power. The reliability of such systems may be increased by interconnecting the various parts of the system by transmission lines which form a network, so that the failure of any transmission line or the suspension of service of any power plant will not prevent the continuous delivery of power to most of the consumers. An interconnected system of this nature which covers the States of California and Oregon extends in one direction for a distance of over one thousand miles. A similar system in the southeastern part of the United States extends for 600 miles from Alabama to North Carolina. In the plan known as the super-power system it is proposed that all sources of power in the United States be ultimately interconnected to form a single national network of power supply.

One advantage of a super-power system would be the decreased coal consumption which would result from the operation of fewer but larger power plants on a system of large power capacity. Another factor which favors the tying together of existing power systems is the consequent improvement in the uniformity of the power demand upon the combined systems. While the major economic advantages of a super-power system relate to a saving in fuel consumption and a decrease in the capital invested in the associated power plants, many other specific arguments may be offered for the plan. A large power network may be made to serve a greater population, since the interconnecting lines may be constructed through regions which previously possessed no power supply. The electrification of railroad trunk lines could be executed with less difficulty by reason of the probable closer proximity of some source of electric power. Wherever a transmission line came within reasonable distance of a possible source of hydraulic power a hydro-electric plant could be constructed which might otherwise have been unjustified by reason of its isolated location.

**Powers, Hiram** (1805-73), American sculptor, was born on a farm near Woodstock, Vt., and in 1810 went with his family to Cincinnati, where in 1826 he began to model and repair wax figures for a local museum. His *Greek Slave*, now in the Corcoran Gallery in Washington, was finished in 1843 and was generally admired. Other noted works are his *Eve Tempted* (1840), *Penseroso* (1845), *Fish-er Boy* (1846), *Proserpine* (1846), and *California* (1858, now in the Metropolitan Museum of New York).

**Powhatan** (c. 1550-1618), celebrated Indian chieftain, whose real name was Wahusona-cook. He was head chief of the Indian tribes with whom the settlers at Jamestown, Virginia, came in contact. In 1607 Capt. John Smith, while on an exploring expedition, was captured by Powhatan's followers, and according to an account not historically verified, escaped execution only through the intercession of the chief's daughter, Pocahontas.

**Powys, John Cowper** (1872- ), author and lecturer, born in Derbyshire, England, resident of the United States much of the time since 1905. Among his books are *Wolf-Bane* (1916); *Mandragora* (1917); *The Complex Vision* (1920); *The Meaning of Culture* (1930); *A Glastonbury Romance* (1933); and *Autobiography* ('34); *Owen Glendower* ('41).

**Powys, Llewelyn** (1884-1939), author, born in Dorchester, England, resident of New York much of the time since 1920. His published books include *Ebony and Ivory* (1923); *Black Laughter* (1925); *The Verdict of Bridle-goose* (1926); *Apples Be Ripe* (1930); *Impassioned Clay* (1931); and *Abridgement of the Life* (1932).

**Poynter, Sir Edward John** (1836-1919), English historical and classical painter and author, was born in Paris. He was director of the National Gallery, London, from 1894 to 1905, and became president of the Royal Academy on the death of Millais in 1896. He was created a baronet in 1902. Poynter's work includes frescoes for St. Paul's (London), St. Stephen's (Dulwich), and other buildings; portraits, notably those of Edward VII. and the Duke of Northumberland.

**Pozzuoli**, town and episcopal see, Italy, in the province of Naples, on a promontory in the Gulf of Naples, 6 m. w. of Naples. Its mineral springs made it a favorite resort of the Romans, and it contains important Roman remains and ruins—the bridge of Caligula, an amphitheatre, the Serapeum, villas, and mausoleums. A branch of the Armstrong shipbuilding yards, with arsenal and navy yard, is lo-

cated nearby and a particularly good cement made from earth peculiar to the locality is manufactured. It was made a Roman colony in 194 B.C., and refounded by Augustus, Nero, and Vespasian. It was the chief port for the Roman trade with Alexandria and Spain; p. c. 23,000.

**Pradier, James** (1792-1852), French sculptor, was born in Geneva, Switzerland. Among his works are *Bacchante and Centaur* (1819), *The Children of Niobe* (1822), *Psyche* (1824), *An Odalisque* (1841), *Spring* (1849), *Pandora* (at Windsor), the Strassburg and Lille monuments in the Place de la Concorde in Paris, *Sappho*, *The Toilet of Atalanta*, the *Three Graces*, and the spandrels in the Arc de Triomphe.

**Prado**, the national Spanish Museum of Art at Madrid.

**Præd, Winthrop Mackworth** (1802-39), English poet, was born in London. Præd's poems, cast in the lighter vein, are characterized by grace, delicacy, and brilliance of wit; while in the *Red Fisherman* he shows a wonderful power of imagination.

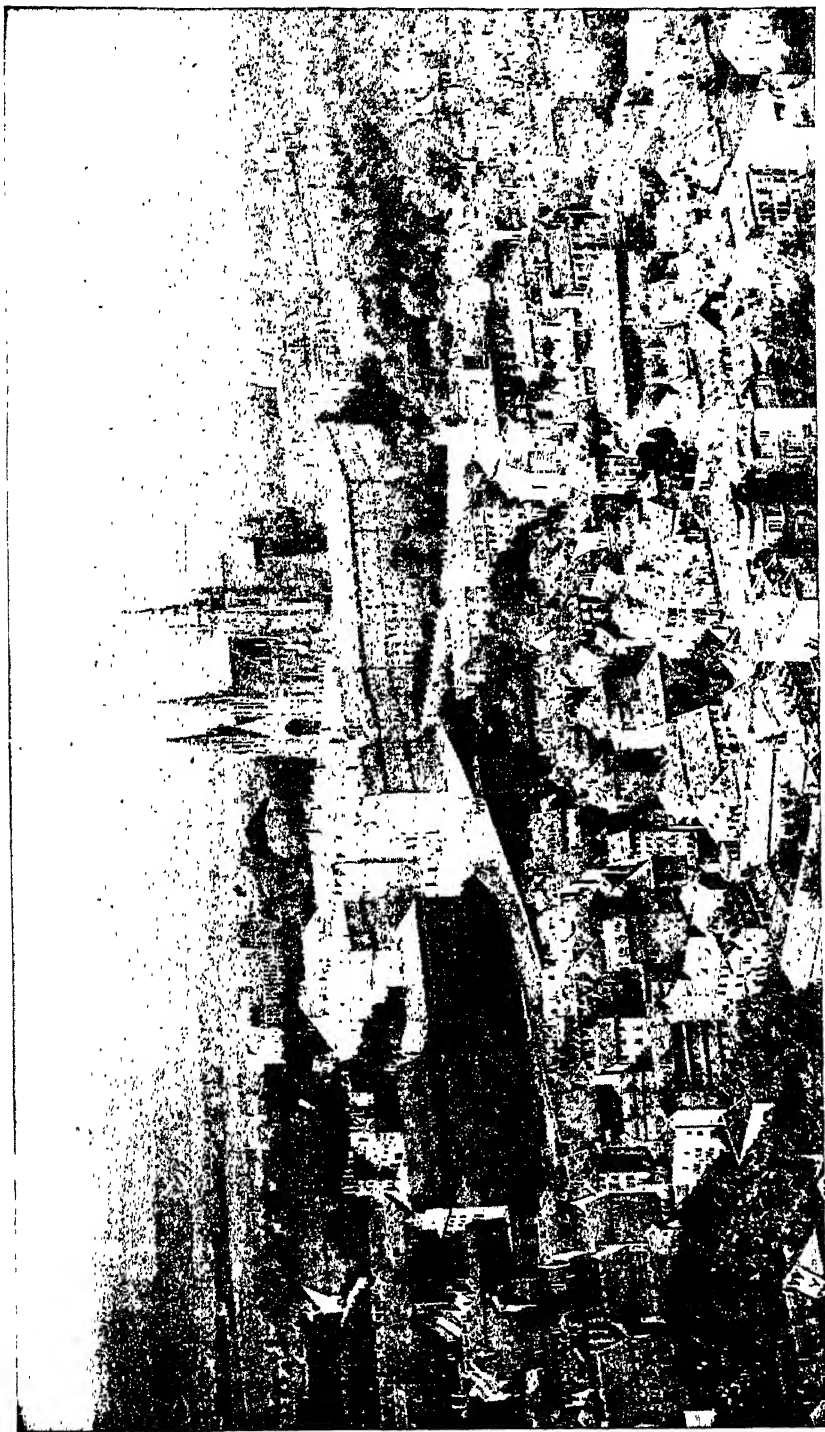
**Præmunire**. The English Statute of Præmunire (1392) forbade the purchase or pursuit in Rome of translations, excommunications, etc., under pain of outlawry, forfeiture of goods, and attachment.

**Prætor**, the chief magistrate of ancient Rome, first elected in 366 B.C., from among the patricians. His main function was at first to rule in Rome while the consuls were absent on military service; hence he was much concerned with civil matters, especially law, which came to be his chief province.

**Prætorians**, of ancient Rome, a body of household troops, instituted by Augustus in 2 B.C. They consisted at first of nine or ten thousand men, horse and foot, and were increased by Vitellius to sixteen thousand. They were suppressed by Constantine the Great in 312 A.D.

**Pragmatic Sanction**, a name given in the middle ages to any ordinance affecting the general interest (*sanctio pragmatica*). By the Pragmatic Sanction of 1438 Charles VII. of France asserted the rights of the Gallican Church. Another famous Pragmatic Sanction was that drawn up by the emperor Charles VI. of Austria in 1713. It declared the indivisibility of the Austrian dominions, and the right of his daughter Maria Theresa to inherit them.

**Pragmatism**, a system of philosophy which in its broadest sense means the acceptance of the categories of life as funda-



*Prague, Bohemia*

©Burton Holmes, from Ewing Galloway, N. Y.

mental. According to the pragmatist an idea is true when it works, when it performs that which is expected of it. Pragmatism is concerned not with thought but with thinking, not with feeling subjectively, but with feeling objectively. Pragmatism was first clearly outlined in the United States in 1878 by C. S. Peirce. It was elaborated and expounded some twenty years later by Professor William James of Harvard and has among its most distinguished followers Professor John Dewey of Columbia, Professor Schiller of Oxford, Professor Jerusalem of Vienna, Jules Henri Poincaré, and Henri Bergson of France, Ostwald and Mach of Germany, and Papini of Italy. Consult James' *Pragmatism*; Leighton's *Man and the Cosmos* (1922).

**Prague**, city, capital of Bohemia, is situated on both banks of the Moldau; 60 miles northeast of Pilsen. The city itself consists of seven districts, the Old Town or Altstadt, Josephstadt, the New Town or Neustadt, and Wysehrad on the right bank; the Little Town or Kleinseite, Hradschin, and Holschowitz-Budna on the left bank. Further up the river are the suburbs of Smichov, Ziskov, Weinberge, and Karolinenthal. The Josephstadt, the former Jewish Quarter, lies e. of the Rudolphinum and contains the Staronova Skola, the oldest synagogue in Prague, and a curious Jewish burial ground.

The Little Town is chiefly residential and contains the fine churches of St. Nicholas and St. Thomas and the Wallenstein and Lobkowitz palaces. The fortress of Hradschin (1333-1757-75) dominates the left bank of the Moldau. From one of its windows in 1618 were hurled the imperial officers Martinitz and Slawata, the initial event of the Thirty Years' War. Prague is the leading industrial and commercial center of Bohemia. Its industries include iron works, manufactures of chemicals, cement, pottery, linen, leather, cottons, hats, carpets, beer, railway cars, and paper. The establishment of the University in 1348 made it one of the leading cities in the German Empire. At the close of the Great War (1918) it was made the capital of the newly constituted republic of Czechoslovakia, dissolved, 1938; p. 849,000.

**Prague, University of**, an institution of learning founded in 1348 by Charles, king of Bohemia, and amalgamated in 1653 with the Jesuit College of Prague.

**Prairie**, an undulating grass-covered plain as distinguished from a forested region

or from a dry semi-arid region known as steppes.

**Prairie Dog**, a large ground squirrel of the Western United States and Mexico. There are three species of prairie dogs, the most common of which is *Cynomys ludovicianus*, found on the open plains e. of the Rocky Mountains. The prairie dog dwells in colonies or 'towns' of burrows.

**Prairie Fox**, the Kit or Swift fox of the Western plains. See Fox.

**Prairie Grove, Battle of**, a battle of the Civil War, fought in Northwestern Arkansas, Dec. 7, 1862. The battle was stubbornly contested all day, but during the night the Confederates withdrew. This defeat checked further advance into Missouri.

**Prairie Hen**, a genus (*Tympanuchus*) of American game birds, belonging to the same subfamily as the grouse. The common species (*T. americanus*) inhabits the region drained by the Mississippi, extending as far n. as Ontario.



*Prairie Hen.*

**Prairie Rattler**, the small ground rattlesnake of the open interior region of the United States. See RATTLESNAKE.

**Prang, Louis** (1824-1909), German-American engraver, lithographer, and art publisher, was born in Breslau, where he studied engraving, chemistry, and dyeing. He established the Prang Educational Company, which issued drawing-books for school use that attained an immense circulation.

**Prase**, a green variety of chalcedony, sometimes used for ornaments, rings, and brooches.

**Praseodymium**, Pr. 140.5, one of the constituents of didymium, is a metallic element of the rare earths. It forms green salts with a characteristic absorption spectrum.

**Pratt, Bela Lyon** (1867-1917), American sculptor, was born in Norwich, Conn. Among his best works are the two figures 'Science' and 'Art' in front of the Boston Public Li-

brary; 'Philosophy' in the Congressional Library, Washington.

**Pratt, Charles** (1830-91), American philologist, was born in Watertown, Mass. He was for many years a trustee of the Adelphi Academy in Brooklyn, and was elected its president in 1879. In 1887 he founded the Pratt Institute in Brooklyn for technical, mechanical, commercial, and similar branches of education.

**Pratt, Orson** (1811-81), Mormon apostle, brother of Parley Parker Pratt, was born in Hartford, N. Y. In 1830 he joined the Mormon Church, and by 1835 had become one of the Twelve Apostles. He was one of the first to enter Utah, and was seven times speaker of the Utah House of Representatives. In August, 1870, he engaged in a debate with Dr. John P. Newman, chaplain of the U. S. Senate, on the subject of polygamy. The debate took place in the great tabernacle at Salt Lake City, and attracted widespread attention. By his numerous successful missionary journeys to the East and to Europe, he gained for himself the designation, 'the Paul of Mormonism.'

**Pratt, Parley Parker** (1807-57), American Mormon apostle, brother of Orson Pratt, was born in Burlington, N. Y. He became a member of the Mormon Church in 1830, was chosen one of the Twelve Apostles in 1833, and was one of the first Mormons to visit Salt Lake. In 1857 he was murdered near Van Buren, Ark.

**Pratt, Silas Gamaliel** (1846-1916), American composer, was born in Addison, Vt. He became professor of pianoforte in the New York Metropolitan Conservatory. In 1906 he went to Pittsburgh, where he established the Pratt Institute for Music and Art.

**Pratt Institute**, a technical school in Brooklyn, New York, founded and endowed in 1887 by Charles Pratt, with the object of promoting industrial education. The Institute offers to men and women day and evening courses in a wide range of art, scientific, mechanical and household subjects and conducts teacher training courses in fine and applied arts. There are four schools: School of Fine and Applied Arts, Household Science and Arts, Science and Technology, and Library Science.

**Praxiteles**, a celebrated Greek sculptor, who is often ranked next to Phidias for the perfection of his work. He was a citizen, if not a native, of Athens, and lived about 400-330 B.C. The chief characteristics of his work are the perfection of his modelling, and the

way in which he makes his statues represent some mood or feeling. During the excavations at Olympia a nearly perfect statue of Hermes by him was discovered. Other statues attributed to him are even more famous, especially an Aphrodite, which he made for the Cnidians, an idea of which may be gained from a copy in the Vatican, and the basis of a group representing Apollo, Artemis and Leto in the presence of the Muses excavated at Mantinea.

**Pray, Isaac Clark** (1813-69), American journalist and playwright, was born in Boston. In 1836 he became proprietor of the National Theatre in New York, where he produced his tragedy *Guilietta Gordon* and several other plays. He became dramatic critic for the New York *Herald* in 1850, and wrote and translated several plays, the most successful of which was *Virginius*.

**Prayer, Book of Common**, the name given to the service book of the Anglican and Protestant Episcopal Churches. The existing English service books are nearly all of the Roman type. Uniformity was not arrived at until the sixteenth century, which produced both the Book of Common Prayer and the Tridentine revision of the Roman services. From the thirteenth century to the Reformation there were three principal 'uses' in English: those of Salisbury, York, and Hereford. The Salisbury or Sarum use has most influenced the present Prayer Book. The movement for reformation in the public service of the English Church originated during the latter years of the reign of Henry VIII. On June 11, 1544, were 'set forth certain godly prayers and suffrages in our native English tongue,' also a Litany which is practically the same as the present Litany in the Prayer Book. A committee of convocation sat for seven years, and produced the Prayer Book of 1549 (the first Prayer Book of Edward VI.).

The second Prayer Book was published in 1552. After Elizabeth's accession a committee was appointed to deal with divine service, and a Prayer Book was ready for publication in 1559. It is practically the same book as that now used in the Church of England. The commonwealth formally suppressed the Book of Common Prayer on Jan. 4, 1645, and it was out of use until the restoration on May 26, 1660, when the Prayer Book was revised on lines as conciliatory as possible, without sacrifice of essentials, and was authorized in 1662.

The Act of Uniformity of that year con-



stituted it the only legal service book in England. There has been no substantial alternation in the English Prayer Book since that time, although since 1906 there has been a strong movement for its revisal and in 1927 a revised form was presented to Convocation by the bishops. The principal changes offered were in regard to the Communion Office and the marriage ceremony. Provision was made for additional services and various occasional prayers were added. The adoption of the revision was voted on favorably by the House of Lords but was rejected by the House of Commons.



*Head of Hermes by Praxiteles*

When the American Episcopal Church was organized a Prayer Book was compiled in 1783 which made too radical departures from the English usage to meet with general acceptance. Another was adopted in 1789 in which the most noteworthy change, aside from things required by local conditions, was the omission of the Athanasian Creed. Another Prayer Book of the Protestant Episcopal Church was published in 1892 after a revision carried on through nine years, aiming at liturgical flexibility and enrichment, but with due regard to conformity with the use of the Mother Church in England. In 1913 at the General Convention of the Church a joint commission consisting of seven bishops, seven presbyters and seven laymen was appointed to consider the revision and enrichment of the Prayer Book provided certain conditions were complied with. In 1929 after a period of fifteen years devoted to study and revision, the new Prayer Book was issued. The most important of its

many changes are those relating to the marriage service.

**Praying Wheel**, a mechanical device used by the Buddhists of Tibet and Central Asia as an aid to prayer. It is generally formed of a pasteboard cylinder, wrapped in long paper bands inscribed with repetitions of the



*Praying Wheel (Tibet)*

prayer, *Om mani padme hum*, which may be translated, 'Oh, the Jewel in the Lotus,' referring to the incarnation of Buddah in a lotus flower. The efficacy of the devotion is reckoned by the number of revolutions made by the wheel.

**Prebend**, a term originally applied to the food given monks at their common table. In English ecclesiastical law it now refers to an endowment given to a cathedral or collegiate church for the support of a secular priest or a regular canon. The holder of a prebend is called a prebendary.

**Precedence**, the order in which individuals are entitled to be seated at a public dinner, presented at any public function, or follow each other in procession. In the United States where there is no hereditary ranking, the most generally accepted order of precedence is as follows: The President, the Vice President and President of the Senate, ambassadors in their order, the Chief Justice of the United States, Senators, the Speaker of the House, Representatives in Congress, associate justices of the Supreme Court, the Secretary of State, members of the Diplomatic Corps, other than ambassadors, and foreign members of international commissions, the Secretary of the Treasury, the Secretary of War, the Attorney-General, the Postmaster-General, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Labor, the general of the army and the admiral of the navy, the governors of States, followed by the various army and navy officers, government officials and the like.

**Precentor**, occasionally called **Cantor**, generally the leader of the musical portion of the service in a church; specifically an officer in an English cathedral, in rank next to dean, who has the direction of the music.

**Preceptory**, a religious house belonging to the order of the Knights Templars. The three principal provincial preceptories were those of Jerusalem, Tripoli, and Antioch.

**Precession**, a slow retrograde movement of the equinoctial points of the ecliptic, by which the interval between successive equinoxes is shortened by 20 minutes. The annual amount of the shift, called the 'constant of precession,' is  $50.25''$ , giving 25,868 years as the period of one complete revolution of the vernal equinox. The phenomenon was discovered about 130 B.C. by Hipparchus, through its effects in changing the apparent places of the stars.

**Precipitation**, a chemical action in which a solid is caused to separate from a solution or sometimes from a gas. The process is utilized to purify solutions, and is also employed in analysis.

**Predestination**, a term meaning the decree of God by which all things are foreordained, and by which, in particular, some men are predetermined (elected) to salvation and others to perdition—the preordination to death being often called reprobation.

**Predicables**, the name given to a certain logical classification of the kinds of predicates that may be affirmed of the subject of a proposition. By Aristotle four such predicables were recognized—*vis.* the definition, the genus (under which the differentia was included), the proprium, and the accident. The predicate must either be convertible with—*i.e.* have the same application as—the subject or not, and if convertible, it must either express the essence of the subject (definition) or not (proprium = attribute peculiar to the subject, and therefore convertible); and if not convertible, it must either be part of the essence (genus) or not (accident = an attribute neither essential nor peculiar).

**Pre-emption**. In the United States, under the Pre-emption Act of 1841, an actual settler on the public lands enjoys the right, in preference to any one else, of purchasing at a fixed price the land on which he has settled, to the extent of not more than 160 acres. In the case of 'offered' lands the settler must file his 'declaratory statement' within thirty days after entry, and within a year proof must be made of settlement and cultivation, and the land thereupon paid for, at \$1.25 per acre if outside the limits of a railroad grant, or \$2.50 if within such limits.

**Pre-existence**, the doctrine of the soul's existence before union with the body, is one of the world's common stock of ideas. It ex-

isted in India, where the Brahmans justified and explained the caste system by proclaiming man's position in the world to be the consequence of his merits or demerits in a previous state. It was found in Greece, where the Pythagoreans added the Egyptian conception of transmigration. Pre-existence, taught by Philo of Alexandria, was adopted by Origen, but combated by Augustine, and rejected by the Council of Constantinople, Traducianism and Creationism being adopted subsequently as alternative beliefs. Direct intellectual interest in the doctrine of pre-existence has nearly died out in modern times, yet the dream has again and again haunted individual thinkers.

**Prefect**, a name applicable to various Roman functionaries. The most important was the *Præfectus urbi*, or warden of the city, whose office existed at an early period of Roman history, but was revived under Augustus, with new and greatly altered and extended authority, including the whole powers necessary for the maintenance of peace and order in the city, and an extensive jurisdiction civil and criminal.

**Preferential Voting**. See Elections.

**Preferred Stock**. See Stock.

**Pregnancy**, the condition following fertilization of the female ovum, and lasting until delivery.

**Prehnite**, a hydrated calcium and aluminum silicate, which is a frequent secondary mineral in igneous rocks, and is derived from the decomposition of feldspar.

**Prelate** (Latin *prælatus*, 'one set over'), a holder of those dignities in the church, to which, of their own right, is attached a proper jurisdiction. In this sense the name comprises not only bishops, but also the heads of religious orders, abbots or priors, and other similar dignitaries. In the papal household many not possessing episcopal jurisdiction have the insignia and title of prelate; and these honors are frequently bestowed on clergy whose duties keep them far from Rome.

**Prelude**, in music, is used to designate a preliminary section of an introductory nature. Fugues frequently contain this feature, and the first movement of a suite is usually styled a prelude. Chopin and others have used the name as the title of a species of composition.

**Premium** (Latin *præmium*, 'profit,' 'reward') is a term used in several connections in the world of commerce. In currency, it is the difference of value between gold and

silver and paper notes of the same nominal amount. In insurance it is a sum periodically paid to secure from a company or association a stated amount in certain contingencies of loss or damage. Again, it means the sum paid in consideration of being taught a trade or profession; or it may be used in the sense of *bonus*, a sum given in respect of services rendered in addition to stated wages. Stock is said to be at a premium when its price is quoted above par—its face value.

**Prendergast, Edmond Francis** (1843-1918), American Roman Catholic prelate, was born in Clonmel, Ireland. He came to the United States in 1859; he was consecrated auxiliary bishop of Philadelphia. From 1895 to 1897 he was vicar-general of the archdiocese, and in 1911 was appointed archbishop.

**Prendergast, William A.** (1867- ), American public official, was born in New York City, and was educated in the public schools of New York and Brooklyn. From 1907 to 1909 he was register of Kings County, N. Y., and in 1909 he was elected controller of the City of New York. He was active in the organization of the Progressive Party. From 1921-30 he was chairman, Public Service Commission, New York State.

**Preposition**, in grammar, the part of speech which connects a noun or a pronoun in an adjectival or adverbial sense with some other word, and which denotes position, direction, time, or similar relationship.

**Prepotency**, a term used in discussions on heredity. Thus, if an organism A be mated with an organism B, and the resultant offspring partake more of the characters of A than of those of B, then A is described as being prepotent.

**Pre-Raphaelites**, a designation usually applied to those artists of the nineteenth century who imitated the art of the Italian painters before Raphael. The name is commonly used of the group of English artists originally comprising W. Holman Hunt, Dante Gabriel Rossetti, and, in his earlier period, John Everett Millais. Hunt, Rossetti, and Millais determined to disregard all arbitrary rules of existing schools, and to seek their own road in art by the patient study of nature, on which the great masters had founded their strength of style. Broadly speaking, their work is characterized by an exaggerated emphasis of detail, such as is found in the simpler art that preceded the advent of Raphael. Ford Madox Brown, from first to last, was in sympathy with the

work of the younger men, and exercised a strong influence on them. For a time in 1850 they published a periodical, the *Germ*, in which some of Rossetti's earliest poetical work and his fine prose study, *Hand and Soul*, appeared. There can now be little question that the Pre-Raphaelite school has exercised a powerful influence upon modern art. One of its chief ambitions from the beginning was the restoration of decorative art, and the sincere expression of spiritual and poetic feeling which had almost disappeared from British art.

**Prerau**, or **Prerov**, town, Moravia. It has an old castle and a Gothic town hall. Manufactures include hardware, machinery, and sugar. It was formerly the chief seat of the Moravian Brethren; p. 21,416.

**Prerogative**, in England, the right pertaining to certain offices, now commonly used in reference to the crown. The royal prerogative is a power of the crown that does not depend on the sanction of Parliament.

**Presbyter**, an officer in the early church who acted essentially in a judicial capacity. The presbyters were the older men in the community and by some authorities the presbyters and bishops are held to be originally identical. It is more probable, however, that the bishops, aided by the deacons, were the administrative officers who directed divine worship and financial affairs. As the growth of church organizations progressed the elders of the community formed two groups, the ruling and the executive officials, called bishops and deacons. At first the term presbyter was applied only to the bishops but later presbyters and bishops were identified, the terms became titles of separate officers and the board of executive officers were called presbyters while the head of the entire congregation was known as the bishop.

**Presbyterianism**, a form of ecclesiastical government by courts composed of presbyters (see **ELDERS**), being opposed to episcopacy on the one hand, and to congregationalism on the other. Strictly interpreted, the term Presbyterian includes all bodies accepting the principle of government by presbyteries, regardless of their theological teachings. In general, however, Presbyterians are strongly Calvinistic.

The Presbyterian form of worship is simple. The church recognizes no priest save Jesus Christ, and its ministers exercise no priestly functions, but are simply preachers and spiritual leaders of the people. It observes two sacraments—Baptism, which is

administered both to infants and adults, either by sprinkling or pouring, and the Lord's Supper. Scripture reading, non-liturgical prayer, the singing of hymns, and preaching constitute the usual service. The irreducible unit in Presbyterianism is the congregation, in which there are three classes of officers—the pastor, the ruling elder, and the deacons, who are elected by the congregation. The congregation is governed by the church session, composed of the elders, presided over by the pastor. This body is under the authority of the next higher court—to wit, the presbytery, in which all the congregations within a certain defined district are represented, each by its pastor and an elder. Over this is placed the synod, comprising the presbyteries, within a large province or section of the land; while the supreme court of Presbyterianism is the General Assembly, to which all the presbyteries in the church send representatives.

The first step in the organization of the Presbyterian church in Scotland was taken in 1557, when the barons of the land bound themselves by the First Covenant to combat Roman Catholicism and to support the Reformation. In 1559 John Knox, returning from Geneva, instilled new life into the movement; and in 1560 papal jurisdiction and the mass were abolished by Parliament, and the Reformed Church duly established. In 1577 a logical and thorough presbyterian system of church government was outlined. A century of conflict with episcopacy followed, which was brought to an end by the Revolution of 1688 and the formal re-establishment of the Presbyterian Church (1690).

The Secession Church of Scotland, begun in 1733 by the withdrawal of the Established Church of Ebenezer Erskine and three other ministers, as a protest against lay patronage and the Socinian tendencies of the church, enjoyed considerable popularity, those who limited the power of the state to secular matters being called 'New Lights,' and the others 'Old Lights.' Of the four bodies thus formed, the New Lights continued as separate churches until 1847, when they united with the Relief Church to form the United Presbyterian Church. The Old Lights of the Anti-Burgher division formed the Synod of the Original Seceders, while the Old Light Burghers rejoined the Established Church.

The United Presbyterian Church was formed by the union of the Relief and Secession churches on May 13, 1847. It continued to do effective work till, by the union with

the Free Church in 1900, it was merged in the United Free Church.

The Reformed Church of Scotland, or Reformed Presbyterians, was descended from the Cameronians and Covenanters, who withdrew from the church in 1712 because of the interference of the state in ecclesiastical affairs. In 1876 the majority united with the Free Church; the minority continued, as Reformed Presbyterians.

The Free Church of Scotland dates from the 'Disruption' of 1843, though the cause of its separate existence was the restoration of lay patronage in 1712. On Oct. 31, 1900, the Free Church was joined with the United Presbyterian Church, the new body taking the name of The United Free Church of Scotland. After the establishment of William on the throne many Scottish settlers made their homes in the n. of Ireland, which thereby became strongly Presbyterian. Defection on doctrinal grounds weakened the church, which later sustained further losses by emigration to America. In 1840 union was effected between the parent synod of Ulster and that which had seceded, and the Presbyterian Church of Ireland was organized.

The earliest Presbyterian churches in the United States were established in New England, Maryland, Delaware, and Virginia, and were largely of English origin. In 1801 a plan of union with the Congregational bodies of New England was agreed upon, which allowed the interchange of Presbyterian and Congregational ministers and the formation of churches composed of members of both denominations. Disruptions occurred over the question of slavery, resulting in the formation of new organizations in the South.

The Presbyterian Church in the United States of America has undergone considerable change in its administrative organization, as the result of the consolidation of a number of its boards and agencies.

The Cumberland Presbyterian Church grew out of a revival in the Cumberland Valley in Kentucky and Tennessee, which resulted in a dearth of ministers for the churches and the irregular ordination of men without the customary training. The Synod accordingly dissolved the Cumberland Presbytery, suspended some of the ministers, and attached the rest to another presbytery. In 1810 an independent body was organized as the Cumberland Presbytery; its doctrine being moderately Calvinistic. In 1906 the General Assembly of the Cumberland Church united with that of the Presbyterian Church

in the United States of America. A considerable number of Cumberland Presbyterian churches constituted a new assembly in 1906, perpetuating the name and organization. The Cumberland Presbyterian Church, Colored, was organized in 1869.

The Welsh Calvinistic Methodist Church was an offshoot of the body of the same name in Wales. The first church was organized at Remsen, N. Y., in 1826.

The United Presbyterian Church of North America is the outgrowth of the union of Scottish immigrants and their descendants who had belonged to the Secession Presbyterians and the Associate and the Reformed Presbyterians of Scotland.

The Associate Synod of North America is the continuance of those Associate and Reformed Presbyterian bodies which did not enter the union out of which came the United Presbyterian Church.

The Associate Reformed Presbyterian Church is the result of a withdrawal in 1821 from the Associate Reformed Church, at the time when the United Presbyterian Church was organized.

The Reformed Presbyterian (Covenanter) Church was organized in 1798 and developed into a synod in 1809, but was divided in 1833 on the question of the relation of its members to the Government of the United States. The two parties were termed 'Old Light' and 'New Light.' The former became the Synod of the Reformed Church of North America. It refuses to allow its members to vote or hold office until there is constitutional recognition of God as the source of power, of Jesus as ruler, and of the Bible as the rule of life. The General Synod of the Reformed Church in North America, the other party to the division of 1833, is known as the 'New Light' and its members exercise their discretion as to participation in political affairs.

The Presbyterian Church in the United States of America is the largest Presbyterian body. The Presbyterian Church in the United States (Southern) is the second largest Presbyterian body.

**Prescott**, city, Arizona, county seat of Yavapai co., situated at an altitude of 5,347 ft., partly surrounded by Prescott National Forest, is widely known as a health resort. The region abounds in gold, silver, and copper. The livestock industry is important; p. (1930) 6,018.

**Prescott, George Bartlett** (1830-94), American electrician, was born in Kingston, N. H. In 1858-66 he was superintendent of

the American Telegraph Company, and in 1866-9 superintendent of the Western Union Telegraph Company. He was joint inventor with Thomas A. Edison of several duplex and quadruplex telegraph instruments (1870-1). In 1873-83 he was electrician to the International Telegraph Company. In 1883 he visited London, and on his return home introduced the pneumatic tube system of transmitting messages in New York City. He was author of various works on electricity.

**Prescott, William Hickling** (1796-1859), American historian. In 1811 he entered the sophomore class at Harvard College. In his junior year a blow from a piece of hard bread, carelessly thrown by a fellow student in the commons hall, destroyed the sight of his left eye. In spite of this serious handicap, however, he finished his college course in 1814 with sufficient credit to secure election to membership in the Phi Beta Kappa Society. For a few months following his grad-



*William H. Prescott.*

uation he read law in his father's office; but an acute attack of rheumatism, centering in his right eye, imperilled his life, and put an end for the time being to all plans of regular study or work. He continued to suffer from rheumatism, accompanied by intervals of blindness, throughout his life; and it was only by the exercise of the strictest self-discipline that he was able to pursue his literary labors.

In 1821 Prescott wrote for *The North American Review* a criticism of Byron's *Letters on Pope*; and from that year until 1850 he continued to be a regular contributor to that periodical. The best of these were subsequent-

ly collected and published (1845) in England as *Critical and Historical Essays*, and in America as *Biographical and Critical Miscellanies*. In 1826 Prescott decided to devote himself to the writing of Spanish history, a decision undoubtedly influenced by the lectures of George Ticknor on Spanish literature; and in that year he began his first great historical work, *Ferdinand and Isabella*. He then began *The Conquest of Mexico*, the most popular of his works, which appeared in 1843, and which added still further to his reputation. *The Conquest of Peru*, a sequence to *The Conquest of Mexico*, was begun in 1844, and published in 1847. Later came the *Reign of Philip II*.

In 1850 Prescott visited England and the Continent, and was everywhere enthusiastically received. In addition to his reviews and his four great historical works already mentioned, Prescott wrote a *Life of Charles Brockden Brown* (1833) for 'Sparks' Library of American Biography,' a memoir of John Pickering (1848) for the Massachusetts Historical Society, and a continuation of Robertson's *Charles the Fifth* (1856). As a whole, his writings have stood the test of time, and are still the best histories of the events with which they deal. They have appeared in various editions, and have been translated into several languages.

**Prescription**, a physician's formula for his prescribed medicines. Formerly written entirely in Latin, now Latin is usually employed only in names of ingredients used. It is only by their botanical or chemical names that drugs can be definitely indicated, but the directions are now written in English.

**Prescription**. In the most general sense of the term the acquisition or extinction of legal rights by lapse of time. More specifically, however, in our legal system the term is limited to the acquisition by long and uninterrupted use of the various classes of rights known as rights in another's land. Both in the United States and England twenty years' use is now generally declared by statute to be necessary for the acquisition of a legal right.

**Presentment**. In law, technically, the action of a grand jury in taking notice of a crime of their own knowledge, where a bill of indictment has not been urged by the public prosecutor. In its broadest sense it includes the finding of an indictment, and the presentment of a matter before any public body for its consideration.

**President of the United States**. The

chief executive chosen for a term of four years by an electoral college. In case of death, removal, resignation or inability, his place is taken by the Vice President. Under the Constitution the President, by and with the consent of the Senate, is empowered to make treaties, to appoint ambassadors and foreign ministers. The President is commander-in-chief of the land and naval forces of the United States. The power of direction over the executive departments was not clearly recognized by early Congresses. The act of 1789 creating the Treasury Department contemplated the direct responsibility of the head of that department to Congress. In creating the Postal Department, also, Congress failed to prescribe presidential direction. In his struggle with the United States Bank President Jackson, through successive removals of secretaries of the Treasury who refused to adopt his policy, definitely established the control of the President over all the executive departments. General control over the administration is exercised through the issue of ordinances or executive regulations. Thus there are organized codes of regulations for the post office, the consular service, the army and navy, etc. Such regulations are sometimes issued by express authority of Congress; sometimes as an exercise of the executive power.

The constitutional legislative powers of the President are the veto power; the power to lay before Congress communications relative to the state of the nation and to recommend such legislation as he may deem expedient; and the power to summon Congress in extraordinary session and to adjourn it in case the two houses fail to agree upon a date of adjournment. All measures and resolutions voted by Congress, excepting a motion to adjourn, must be submitted to the President for approval; if he disapprove of such measures, a two-thirds vote in Congress is required for enactment. He is subject to impeachment by the Senate for treason or other high crimes or misdemeanors. Upon the expiration of his term of office he becomes liable for wrongful acts committed in his term of office. In case of death of both President and Vice President elect, there is no constitutional or statutory provision for filling the office of President for the succeeding term. Constitutional qualifications for the Presidency are citizenship acquired by American birth, 14 years' residence in the U. S., and an age of not less than 35 years. His

official residence is the White House, Washington. For the mode of election, see ELECTIONS.

**Press, Freedom of the.** In England and the American colonies the struggles against censorship of the press were marked by common recognition of the facts that the government may be criticised, and that the right of criticism ought always to be unfettered in matters plainly affecting the public good and public safety. There arose among friends of popular government there a conviction that the press was an indispensable instrument in securing its progress and permanence. But it was not till 1764, when the *North Briton* of John Wilkes was prosecuted by Grenville's ministry, that the right of the press to discuss public affairs was established. Six years later the failure of the prosecution directed against 'Junius' for his *Letter to the King* established the right of the press to criticize the conduct, not of ministers of Parliament only, but of the sovereign himself.

In the American colonies, the governors were intrusted with the power of royal censorship, but its exercise was strongly resisted. The methods of English opponents of a free press were practiced in Pennsylvania, New York, and other colonies. The most notable case was that of Peter Zenger, the publisher of the *New York Weekly Journal*, who was tried for libel. By their verdict of acquittal in 1735 the jury, ignoring the admonition of the presiding chief justice, assumed to decide both the law and the fact, and thereby established for all the colonies a precedent which assured free discussion. On the continent of Europe no rigid censorship exists; but in its place, and in apparent defiance of constitutional provisions to the contrary, there are severe laws against certain activities of the press in several of the countries.

**Press Associations,** local, national, or international associations for the collection and dissemination of news. The idea of collecting news and selling it to subscribers appears to have originated with Paul Julius Reuter, a German telegraph employee, who about 1845 opened an office in Aix-la-Chapelle. In 1851, having induced the London *Times* to try his service, he moved to London, where the business was conducted with such care and accuracy, especially with regard to political news, that the service was soon indispensable to every important newspaper in England and on the Continent. About 1857 the New York Associated Press was organized, with an agent in all large cities of the

United States. It has photographic and feature services as well as being the largest distributor and gatherer of news, with private wire system. There are various other well known press associations and many press services which specialize in providing photographs and feature news.

**Pressburg,** or **Bratislava,** town, Slovakia, capital of the district of Bratislava, on the left bank of the Danube; 58 miles northeast of Odenburg. Pressburg is the center of a wheat and vine growing district. Glassware, musical instruments, gloves, mineral oil, champagne, and edible fats are the principal articles of commerce. Since the Great War it has become the chief Slovakian port on the Danube and has been greatly enlarged and improved; p. 93, 189.

**Press-clipping Bureaus,** firms whose business is to supply extracts from the press of the United States and abroad on any particular subject to those interested in such information.

**Pressgang,** a term in Great Britain denoting a gang or detachment of seamen employed on shore to impress seafaring men and others into the king's service in time of emergency.

**Pressure,** a force which depends on two factors, being proportional to the force exerted, and inversely as the area acted on. Thus, if a force of 20 lbs. weight is concentrated on an area of 1 sq. inch, the pressure will be 100 times greater than if the same force is spread over 100 sq. inches.

**Pressure Gauge,** an instrument for indicating the pressure of a fluid contained in a vessel.

**Prester John,** or **Presbyter John,** a personage believed in the 12th century to be reigning over a Christian kingdom in the Far East. In the popular belief he was often identified with the apostle John. Opinions differ as to the original of this practically mythical character.

**Presto,** a term in music meaning that the composition should be performed in a rapid manner.

**Preston, Thomas Scott** (1824-91), American Roman Catholic cleric. He served in several parishes in New York, and became private secretary to Archbishop Hughes. From 1853 to 1873 he was chancellor of the archdiocese; from 1873 to 1881, vicar-general; and domestic chaplain to the Pope from 1881 onward, with the title of Monsignor.

**Prestonpans,** town on the n.w. coast of Haddingtonshire, Scotland; 9 miles e. of Ed-

inburgh. Near here Prince Charles Edward defeated the Royal troops under Sir John Cope (Sept. 21, 1745).

**Presumption** of law is an inference drawn by the law in certain cases which may either be absolutely conclusive and irrebuttable by contrary evidence, or hold good only if the contrary is not proved. Examples of irrebuttable presumptions are that every one knows the ordinary law of the country or State, and that persons below seven are incapable of committing crime. The second class may be illustrated by the presumption that persons who have not been heard of for seven years or some other period fixed by law are dead; that a husband is the father of his wife's child; that a prisoner is innocent.

**Pretoria**, city, seat of administration of the Union of South Africa, and capital of Transvaal prov. Pretoria University is located here and there are iron and cement industries. Pretoria was laid out in 1855, and named after Andries Pretorius, first president of the South African Republic. It succeeded Potchefstroom as the seat of government in 1863. On June 5, 1900, it was captured by Lord Roberts, at the head of the British army. In 1909 it was made the seat of administration of the newly formed Union of South Africa; p. 96,500.

**Prévost, Abbe** (1697-1763), **Antoine Francois Prevost d'Exiles**, commonly called the **ABBE PREVOST**, and immortal as the author of *Manon Lescaut*, was born in Hesdin, France. At twenty-four he joined the Benedictines of St. Maur. In 1728 he published the first of his novels, the *Mémoires d'un Homme de Qualité*, to which *Manon Lescaut* forms a kind of supplement. He was befriended by Cardinal de Bissy, and by the Prince de Conti, whose chaplain he became, and in thirty years he wrote over a hundred volumes. *Manon Lescaut* remains fresh, charming, and perennial. One feels in this unique book that it is impossible to say where reality ends and fiction begins, and it remains to this day unequaled as a truthful realization of one overmastering passion.

**Prévost, Marcel** (1862-1941), French novelist and dramatist, born in Paris. He was a civil engineer until 1890. His first success as a novelist was with *Le Scorpion* (1887). His earlier works include *Mademoiselle Jauffre* (1889); *La Cousine Laura* (1890). *Les Demi-Vierges* (1894) is a study of the effect of a Parisian education and social life on young women, and it is for his delineations of feminine psychology that Prévost is espe-

ally known. Later works include *Les Vierges fortes* (1900); *Les Lettres à Françoise* (1902); *L'homme Vierge* (1929).

**Prévost-Paradol, Lucien Anatole** (1829-70), French journalist, was born in Paris. In 1855 he was appointed professor of French literature at Aix. He at once became a contributor to the *Journal des Débats* and *Courrier du Dimanche*; and from time to time he published collections of essays on literature and politics, of which the best is his *Essais sur les Moralistes Français* (1864). He was elected to the Academy (1865), and in 1868 visited England. On the accession of Ollivier to power (1870) he allowed himself to accept the post of envoy to the United States. Scarcely was he installed when the war with Germany broke out, and Prévost-Paradol, his mind unhinged, committed suicide at Washington. His works include: *Essai de Politique et de Littérature* (3 vols., 1859-63); *Quelques Pages d'Histoire Contemporaine* (1862); *La France Nouvelle* (1868). Consult Gréard's *Prévost-Paradol*.

**Priam**, or **Priamus**, king of Troy at the time of the Trojan War, was the son of Laomedon and Strymo or Placia.

**Priapus**, in ancient Greek mythology, a son of Dionysus and Aphrodite. He was especially worshipped at Lampsacus on the Hellespont. He represented the reproductive power and fertility of nature. Rude images of him often stood in gardens; he was represented carrying a sickle, and with a large phallus. Priapus was also regarded as a deity of lascivious passion.

**Pribilof (Pribilof) Islands**, a group of islands in Bering Sea, Alaska. They are also known as the Fur Seal Islands. They are a chief center of seal fishing.

**Prickly Heat** (*Miliaria papulosa*), a skin disease characterized by minute but extremely irritable red papules formed by hyperæmia of the sweat glands. The condition is due to excessive sweating, such as occurs in a hot climate. It seldom calls for treatment, but when the irritation is very severe, sponging with an alkaline lotion gives relief. Those who suffer from prickly heat should take as little fluid as possible.

**Pride, Thomas** (d. 1658), one of the most resolute of Cromwell's soldiers. On Parliament showing a tendency to treat with the king, Pride, under orders from Fairfax, set a guard round the House of Commons, and excluded about ninety members favorable to an agreement (1648). This act became known



as 'Pride's Purge.' Pride was a commissioner for the trial of Charles I., and signed his death warrant.

**Priene**, anciently one of the 'twelve' cities of Ionia, situated northwest of the mouth of the River Maeander, in Caria. The remains of the ancient city have been brought to light.

**Priest**, the title, in its most general signification, of a minister of public worship, but specially applied to the minister of sacrifice or other mediatorial offices. In Egypt the population is supposed to have been divided into three or four castes, at the head of which was the sacerdotal, or priests. Their duties appear to have comprised the general cultus of the deity; they also interpreted the oracles of the temples. Besides the prophets of the gods, others were attached to the worship of the king, and to various offices connected with the administration of the temples. The class of priests called *ab*, or 'pure,' were inferior, and were also attached to the principal deities and to the personal worship of the monarch. They were required to be scrupulously neat and clean, entirely shaven and ascetic in their diet, bathing and fasting frequently.

The priesthood of India belongs to the first caste, or that of Brahmans, exclusively (see CASTE). But as the proper performance of such functions requires, even in a Brahman, the knowledge of the sacred texts to be recited at a sacrifice, and of the complicated ceremonial of which the sacrificial acts consist, none but a Brahman learned in one or more Vedas, and versed in the works treating of the ritual, possesses, according to the ancient law, the qualifications of a priest.

The Mosaic priesthood was the inheritance of the family of Aaron, of the tribe of Levi. It consisted of a high priest, and of inferior ministers, distributed into twenty-four classes.

The name given in classical Greek to the sacrificing priests of the pagan religion, Greek *hierens*, Latin *sacerdos*, is not found in the New Testament explicitly applied to ministers of the Christian ministry; but very early in ecclesiastical use it appears as an ordinary designation; and with all those bodies of Christians—Roman Catholics, Greeks, Syrians, and other Orientals—who regard the eucharist as a sacrifice (see LITURGY) the two names were applied indiscriminately.

The priesthood of the Christian Church is one of the grades of the hierarchy, second in order only to that of bishop, with which order the priesthood has many functions in

common. The holy order of priesthood can only be conferred by a bishop, and he is ordinarily assisted by two or more priests, who, in common with the bishop, impose hands on the candidate. The rest of the ceremonial of ordination consists in investing the candidate with the sacred instruments and ornaments of his order, anointing his hands, and reciting certain prayers significative of the gifts and the duties of the office.

The distinguishing vestment of the celebrant priest in the Mass is the *Chasuble*. In Catholic countries priests wear even in public a distinctive dress, in most respects common to them with the other orders of clergy.

**Priestley, John Boynton** (1804- ), English novelist and critic, wrote *Good Companions* (1929); *Angel Pavement* (1930); *English Journey* (1934).

**Priestley, Joseph** (1733-1804), English chemist, was born near Birstall, Yorkshire. It was while acting as literary companion to the Earl of Shelbourne that he made (1774) his epoch-making discovery of oxygen. His later work on nitric oxide, hydrogen chloride, silicon fluoride, sulphur dioxide, ammonia, air, and carbon monoxide was also of the highest value; and, in the case of his observations of the action of electric sparks on the air, led to the analysis of the latter by Cavendish. He was the first to apply carbon dioxide in aerating waters.

**Primage**, a small allowance (from three to ten per cent.) formerly paid, in addition to wages, to the captain of a ship by the freighter, as a recognition of his care in superintending the loading and unloading of goods while the vessel was in port.

**Primary Colors**, the name of the colors into which Newton arbitrarily divided the spectrum, though sometimes restricted to the three colors, red, yellow, and blue from which all the other colors may be produced. See COLOR.

**Primate** (Latin *primus*), anciently a bishop holding a position of pre-eminence. Thus the bishop of Rome claimed the primacy of the whole church. In the Church of England the title is peculiar to the Archbishop of York, who is Primate of England.

**Primates**, the first order of mammals, so called because it includes man. The order includes two sub-orders, which by some authorities are raised to ordinal rank. These are the *Lemuroidea*, or lemurs, and the *Anthropoidea*, including monkeys in the wide sense, anthropoid apes, and man. The *Lemuroidea* are much lower in organization than the An-

thropoidea. The Anthropeidea are divided into five families: (1) the Hapalidae, or marmosets; (2) the Cebidae, or New World monkeys; (3) the Cercopithecidae, or Old World monkeys; (4) the Simiidae, or anthropoid apes; and (5) the Homindae, including only man. See MAMMALS.

**Prime, Samuel Irenæus** (1812-85). American clergyman and editor. was born in Ballston Spa, N. Y. Becoming editor of the *New York Observer*, his 'Irenæus' articles, published weekly, were one of the features of the paper.

**Prime, William Cowper** (1825-1905). American writer on art, was born in Cambridge, N. Y. In 1874 he was appointed first vice-president of the Metropolitan Museum of Art, and in 1884, as the result of his efforts, the authorities at Princeton established a chair of the history of art, of which he became the first incumbent.

**Prime Minister, or Premier.** In constitutional countries having responsible ministers, the prime minister is that member of the parliamentary body who is chosen by the sovereign or chief executive to form and assume the leadership of the cabinet or ministry, which is composed of the heads of the administrative departments of state. The prime minister usually takes for himself the portfolio of foreign affairs and in Great Britain is leader of that House of Parliament of which he is a member.

**Primer**, any device for igniting the propelling charge of small arms or cannon.

**Prime Vertical**, a great circle passing through the zenith at right angles to the celestial meridian, and hence through the e. and w. points of the horizon.

**Primo de Rivera, Miguel** (1870-1930), Spanish soldier and political leader. He was appointed to the difficult and dangerous post of Captain-General of Catalonia, which was in a condition of chaos, due to a breakdown of the parliamentary régime. In 1923 he became Dictator of Spain. He resigned in January, 1930, going into exile voluntarily, and died soon after.

**Primogeniture**, the rule of law under which the eldest son of the family succeeds to the father's real estate in preference to, and in absolute exclusion of, the younger sons and all the sisters.

**Primrose** (*Primula*), a genus of plants of the natural order Primulaceæ. There are more than 100 species, mostly perennials and many beautiful hybrid forms have been developed and extensively cultivated as orna-

mental plants. The name primrose (French *Primevère*, Latin *Primula*) is derived from the Latin *primus*, 'first,' and refers to the early appearance of the flowers of some of the most common species in spring. The common primrose (*P. vulgaris*), abundant in woods, hedgebanks, and pastures in most parts of Europe, has obovate-oblong, wrinkled leaves, and single-flowered scapes; the flowers about one inch broad, yellowish white.

**Primulaceæ**, an order of plants containing more than two hundred known species, mostly inhabitants of the cooler parts of the world. Among its best known members are the primrose, cowslip, polyanthus, auricula, pimpernel, cyclamen, and soldanella.

**Prince**, a title originally used to denote the person who was entitled *princeps senatus* in the Roman state. Subsequently it became a title of dignity. In the course of time it came to be applied to certain sovereigns of smaller states possessing more or less political independence. It is now very generally applied to the sons of kings and emperors and persons of the blood royal, sometimes with a territorial title (Prince of Wales, Prince of Orange), or with an addition, 'crown prince,' or 'prince imperial.'

**Prince, John Dyneley** (1868- ). American educator and diplomat, born in New York City; professor of Semitic languages (1892-1902), dean of the Graduate School (1895-1902) at New York University; and professor of Semitic languages (1902-15) and of Slavonic languages (1915-21) at Columbia University. He was envoy extraordinary and minister plenipotentiary to Denmark (1921) and to Yugoslavia (1926-33). His writings include, *Mene, Mene, Tekel*, *Upharsin* (1893); *Assyrian Primer* (1909); *Practical Grammar of the Lettish Language* (1925); *Grammar of the Serbo-Croatian Language* (1929).

**Prince Edward Island**, a province of the Dominion of Canada. The island is the shape of a crescent, with its concave side toward the n. Its coast line, particularly on the s., is very irregular, and deeply indented with arms of the ocean. The climate is milder than that of New Brunswick, and is not subject to such extremes. The soil is extremely fertile, and its great productivity has given to the island the popular name of the 'Garden of the Gulf.' The fisheries form an important source of revenue. Agriculture is the most important industry. Manufactures are not important and are mainly seasonal, being al

lied with the farming and fishing industries. Fox farming was introduced about 1887 and by a system of breeding a pure type of silver black foxes was established, the pelts of which brought such high prices that the growth of their industry was assured. There were in 1932 approximately 700 ranches on the island ranging from two pairs up to over 100 pairs per ranch.

Prince Edward Island is the most densely settled province of Canada. Over 97 per cent. of the population is Canadian born and descended from English, Scotch, Irish and French settlers; p. 88, 938. Charlottetown is the capital. Jacques Cartier discovered Prince Edward Island in 1534, but thought it was part of the mainland. When its separate entity was established it was given the name of Isle St. Jean. In 1798 it was renamed Prince Edward, as a compliment to the Duke of Kent, who at that time was commander-in-chief of the British forces in the British American provinces. In 1603 Champlain claimed possession. In 1758 it was occupied by a British force, and was finally ceded to Great Britain in 1763. Consult B. Bremner, *Island Scrap Book* (1932); *The French Régime in Prince Edward Island* (1926); W. R. Livingston, *Responsible Government in Prince Edward Island* (1931); *Handbook on P. E. Island*.

**Princeton**, borough, Mercer co., New Jersey. It is the seat of Princeton University and of Princeton Theological Seminary. The chief architectural features are the handsome Gothic buildings on the university campus; p. 7, 719.

**Princeton, Battle of**, in the American Revolution, was fought near Princeton, N. J., on Jan. 3, 1777. The Americans were scattered and General Mercer was mortally wounded.

**Princeton Theological Seminary**, a divinity school of the Presbyterian Church, at Princeton, N. J., founded in 1812.

**Princeton University**, a leading institution of higher education at Princeton, N. J., founded in 1746 as the College of New Jersey. The college was opened at Elizabethtown with Jonathan Dickinson as president. On his death, in 1747, Aaron Burr became president and the institution was removed to Newark. In 1756 it was transferred to its present site at Princeton, where the first building had been erected and named Nassau Hall. Jonathan Edwards was elected president in 1757, Samuel Davies in 1759, and Samuel Finley in 1761. In 1768 John Withers-

poon came from Scotland to take the presidency, and he remained at its head through the Revolutionary War period. The war told heavily on the college. In 1783 Congress was obliged to retire to Princeton, and for a time Nassau Hall became the capital of the nation. Dr. Witherspoon was succeeded in 1795 by Samuel Stanhope Smith. During his administration, Nassau Hall was burned (1802) and rebuilt in 1804. During the administration of Francis Landey Patton (1888-1902), the number of students and instructors was more than doubled, seventeen new buildings were added, and in 1896 the corporate title was changed from the College of New Jersey to Princeton University. President Patton resigned in 1902 and was succeeded by Woodrow Wilson, the first lay president. He resigned in 1910 to become Governor of New Jersey. John Grier Hibben was elected president and inaugurated May 11, 1912. He was succeeded, June, 1933, by Harold Willis Dodds. Consult Williams' *Handbook of Princeton*; Collins' *Princeton* (1914); *Annual Catalogues* of Princeton University.

**Prince William Sound**, a large inlet of the Pacific Ocean, on the southern coast of Alaska, just e. of Kenai peninsula. It is a strikingly picturesque region backed by towering snow-capped mountains and forest-lined cliffs.

**Principal and Agent**. When one person authorizes another to act on his behalf, accepting responsibility for such action as far as it lies within the scope of the authority granted and when such other person undertakes to exercise the authority thus conferred upon him, they are known respectively as the principal and the agent. The relation of principal and agent is usually created by contract.

**Printing.—Early History.**—Printing was practiced in the Low Countries and in Germany during the first half of the 15th century, in the form of xylography—impressions taken by 'squeezes' from inked wood blocks upon which an illustrated text had been cut. This was the 'forebuilding' of typography, which was invented some time before 1450 by Johann Gensfleisch or Gutenberg. The earliest dated documents printed from movable types are two indulgences (grants of spiritual privileges in return for alms), printed in the autumn of the year 1454. These can be assigned with certainty to the city of Mainz in Germany, and the printer of one of them must have been Johann Gutenberg, and the other Johann Fust, a goldsmith who had lent Gutenberg

money, but with whom by this time he had quarrelled. Gutenberg had been making experiments in printing from movable types, first at Strassburg, afterward at Mainz, since about 1440, and in 1904 there were reproduced in facsimile fragments of a calendar, apparently for the year 1448, and of a short poem on the Judgment of the World, which may belong to this experimental period. The publication at Mainz of the magnificent 42-line Latin Bible, known as the Gutenberg (or Mazarin) Bible, marked the completion of the experimental stage of printing. In 1470 a Frenchman from Tours, Nicolas Jenson, also began issuing books at Venice, and his beautiful roman type has served as a model to many other printers both in his own day and in recent times. During the 15th century more than a hundred and fifty firms of printers worked at Venice, whose output equalled that of all the 70 other Italian towns where the art of printing was practiced, and half that of Germany.

The claim of Lourenz Janszoon Coster, an innkeeper, about whom as the inventor of printing a fanciful legend sprang up in the 16th century, is unsupported by any evidence. In what is now Belgium, printing began at Alost in 1473; in 1474 or 1475 it was introduced into Spain at Valencia; and in 1476 into England by William Caxton, who in the two previous years had printed a few books at Bruges, with the help of a Bruges calligrapher, Colard Mansion. The first book printed by Caxton at Bruges was *The Recuyell of the Histories of Troye*; the first dated book printed in England, *The Dictes and Sayings of the Philosophers* (1477). About 1520 the primacy of European printing passed from Italy to France; and under the influence of the Estiennes, Simon Colines, Geoffroy Tory, and Jean de Tournes much excellent and scholarly work was produced both in Paris and in Lyons. When religious persecution lost France many of her best printers, Antwerp, under the influence of Christopher Plantin, became for a time the most important center of printing in Europe. But by the beginning of the 17th century the desire for cheapness, which had caused a steady deterioration in both paper and ink, had reduced printing to a low level all over Europe. But toward the end of the 17th century British printers, who had hitherto slavishly imitated the Dutch, now began to initiate good work, partly through the improved types supplied by William Caslon (d. 1766), the first great English typesetter.

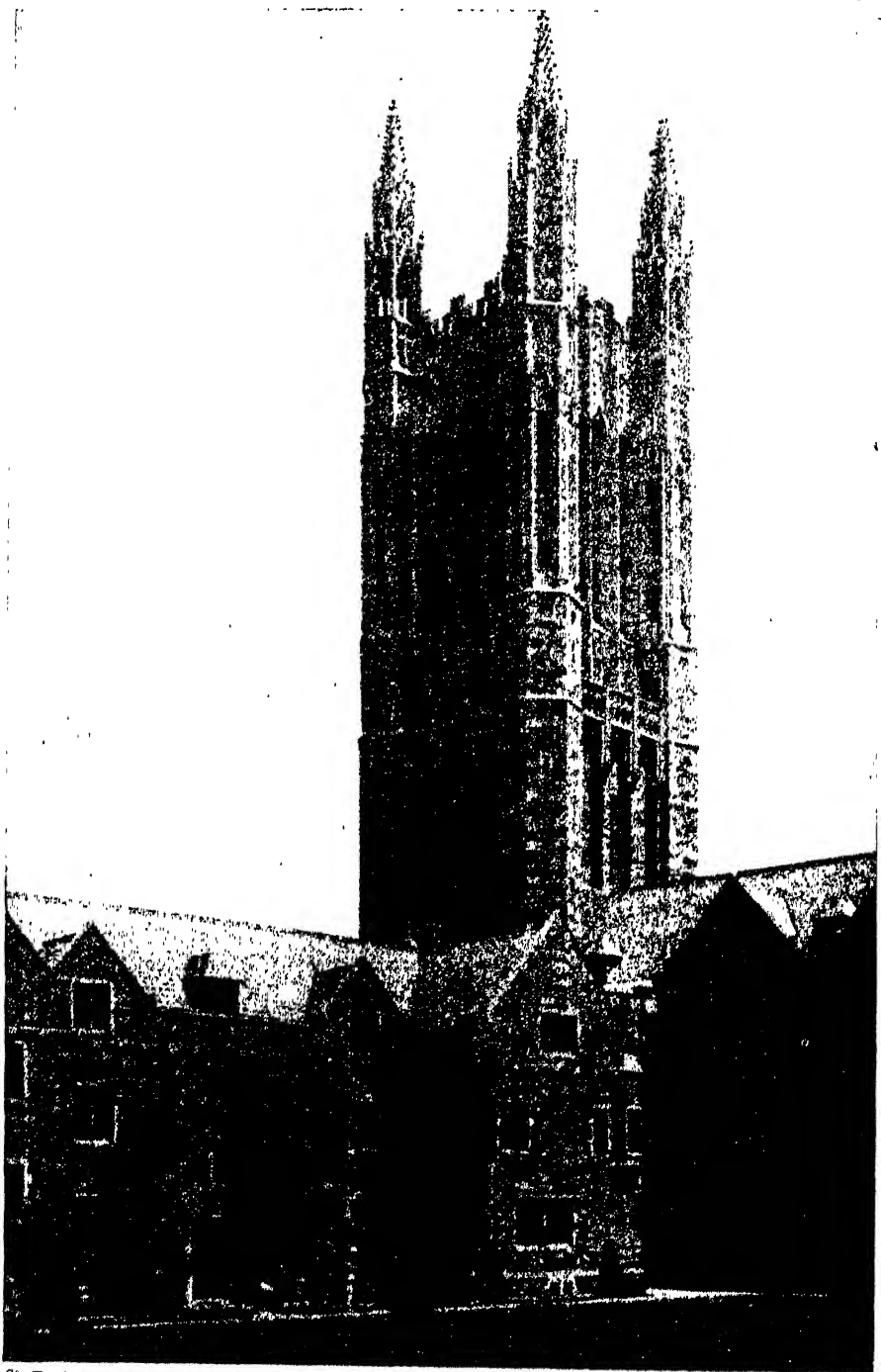
The experiments of John Baskerville (1706-

75) with types in which the differences between the thin and thick strokes were strongly accentuated, were imitated abroad in Italy by Bodoni of Parma (1740-1813), in France by Didot (1720-1804), and in Germany by Göschen of Leipzig (1752-1838). The revived use of old-faced type by the Chiswick Press (founded by Charles Whittingham in 1789) was followed by an increased attention to the decoration of books, which after some vicissitudes reached its culmination in the experiments of William Morris and his followers with the books of the Kelmscott Press, the Vale Press, the Dove Press, and others.

It is probable that intaglio printing may be considered one of the earliest forms of printing used, as some time before the date ascribed for the invention of letterpress printing, mediæval goldsmiths doing niello work were accustomed to fill the incised lines in the metal plates with coloring matter from which proofs showing the progress of the design could be drawn.

Composition is the name given to the operations of setting type and preparing it for the printing press. The 'copy' is 'set' by a compositor standing in front of two trays. The two cases are designated as upper and lower cases, the upper case containing the capital letters, signs, etc., the lower case holding the small or lower-case letters of the alphabet, the figures, punctuation marks, etc. In 'setting,' the compositor picks out one by one the letters needed to form each word, and arranges them in a 'composing stick' or metal box (set to the required width of page or column), which he holds in his left hand. Type, being the reverse of the printed impression, is set from left to right and upside down.

A galley is a shallow quadrangular box, open at the top and at one end. A 'proof' (rough impression) is then taken from the matter on a hand-press, or more frequently a specially designed proof-press, and is given to a 'reader' for comparison with the copy. Corrections to be made are noted on the proofs by special 'readers' marks, the commonest of which are shown in the accompanying illustration. It should be noted that today very little 'straight matter' is set by hand. Although matter set by a skillful compositor presents a more smooth, even, and beautiful appearance, typesetting machines are able to do this work so much more cheaply that hand-set matter is used only in de luxe editions of books and in advertising dis-



© Ewing Galloway.

*Graduate College Tower, Princeton University.*

play. All newspapers and magazines are now set by machines. For a description of these, see TYPESETTING MACHINES.

The original press was made of wood with a platen lowered and raised by a screw instead of by a lever with mechanical attach-

to ink the form, and to lower the platen. The only modern presses, other than hand-presses, retaining the platen device are the small-power jobbing presses, in which the form is placed in a vertical position, the platen at a varying angle. The invention of the cylinder

### Signs and Abbreviations.

Δ Delete; take out marked type, word, or sentence.	7 Move to right.
○ Reverse type.	⌋ Indent line
# Insert a space, or more space.	[ New paragraph.
L Less space.	Range lines.
( Close up.	== Range letters or lines.
⌋ Take out and close up.	↓ Push down appearing space.
7 Move to left.	X Change broken type.

*w.f.*, wrong font; *tr.*, transpose; *l.c.*, lower case type or small letters; *s.c.*, small capital letters; *caps.*, capital letters; *rom.*, change italic to roman; *ital.*, change roman to italic; *stet.*, retain what is crossed out.

### Specimen 'First Proof.'

*caps.*  
*s.c.*  
JOHNSON.  
By Thomas Carlyle.

Δ A for Johnson, I have always considered him to to be, by nature, one of our *great* English *rom.*  
souls. A strong and noble man; so much left *L*  
*to the last* undeveloped in him; in a kinder element what *li/*  
might he not have been, Poet, Priest, sovereign *cap.*  
*reign* ruler! On the whole, a man must not *#*  
complain of his 'element,' of his 'time,' or the *7*  
like; it is thriftless work doing so. His time *o*  
is bad; well, then, he is there to make it *o*  
better.)  
*rom. on.* (Johnson's youth was poor, isolated, hopeless, *cap.*  
very miserable; indeed, it does not seem *inf.*  
possible that, in any ~~the favourable~~ outward *stat.*  
circumstances, Johnson's life could have been *li/*  
other than a painful one. The word might *li/*  
have had more of ~~profitable~~ work out of him, *ital./k.*  
or less, but his effort against the world's work *cap.*  
could never have been a light one. [Nature, in *cap.*  
return for his nobleness, had said to him, live in *cap.*  
an element of depressed sorrow. Nay, perhaps *cap.*  
the nobleness and the sorrow were intimately *cap.*  
and even inseparably connected with each other. *#*  
At all events, poor Jonson had to go about *cap.*  
with continual hypochondria, physical and spir- *cap.*  
itual pain. Like a Hercules with the burning *li/*  
Nessus'shirt on him, which shoots in on him *li/*  
dull, incurable misery: the Nessus-shirt not *li/*  
to be stript off, which is his own natural skin; *li/*

### Proof-readers' Marks

ments like the later models. About 1800 Lord Stanhope built the first iron press, very similar to the hand-presses now in use. With the introduction of steam came the steam platen press, using power to move the form backwards and forwards under the platen.

press by Friedrich König in 1811-14 revolutionized printing. The platen was replaced by an iron cylinder, the tympan by packing fastened around the cylinder. Instead of sheets being laboriously attached to the tympan, they were seized by metal 'grippers' on

the cylinder. The bed with the form still travelled backwards and forwards, but the improvement in feeding allowed it to move at ten times its former speed without any difficulty in keeping it supplied with paper. Cylinder presses, improved from König's model, remain today the commonest form of printing press. It should be noted that there are two kinds of cylinders in use in printing presses—'impression cylinder' and 'form' or 'type cylinders.' The first cylinder presses, printing one side of the paper only, had one impression cylinder, the form being flat; the perfecting press, printing both sides, had two impression cylinders, the form being still flat. Rotary presses have the form curved around a form cylinder. They have either one impression cylinder and one form cylinder, and print one side of the paper, or two of each, and print both sides. The cylinder press provided for an 'impression cylinder' with a flat form. Later came the further development of a 'form cylinder,' with stereo or electro plates curved round it, the two cylinders—impression and type—running continuously in gear, and the paper being impressed between them. This movement has greatly increased the possible speed and output of printing machinery. The first press of this type, the rotary press, was invented by Thomas Nelson of Thomas Nelson and Sons, Edinburgh, and exhibited, 1851. Almost every rotary machine is designed specially, and no general description is possible.

**LITHOGRAPHY** (commonly called 'litho').—This process was developed through the discovery of certain properties of a German limestone, called lithographic stone. The litho process depends on two properties of the stone—its absorption of grease and the fine polish which its surface will take—and on the mutual antipathy of grease and water. The design to be printed is drawn on the stone in reverse with a greasy ink. The stone is then fastened in a machine resembling an ordinary flat-bed press. The printing is done as in the latter, with the exception that a water-roller goes over the whole stone before the ink-rollers are applied. The greasy ink of the design repels the water, and none can settle on it; but where there is no design, the water damps the finely-polished surface of the stone. The effect of the ink-roller is exactly the opposite. The greasy design freely takes additional ink; the moist, polished surface repels it. In this way only those portions of the printing surface covered with the design receive the necessary ink for printing.

The aluminum rotary printing press for printing one side of the paper from a sheet of that metal bent around the cylinder is rapidly displacing the ordinary lithographic press, as it more than doubles the output. An aluminum perfecting press has also been invented. Lithography was, until thirty years ago, practically the only method of printing designs and work in colors. It is now, however, possible to make a raised 'plate' from any design (see **PROCESS WORK**), and print from it by the letterpress method, which is cheaper and quicker for large editions. Lithography by the photo-lithographic process, and particularly when printed by the off-set process, has recently made great strides and is competing on even terms with letterpress printing. Off-set printing is now by far the most important branch of lithography.

**INTAGLIO PRINTING.**—This method is the costliest form of printing. The surface consists of a smooth plate of copper or steel, in which depressions are either cut by hand with a 'graver' (a fine engraver's chisel) or bitten out by acid. An 'ink-ball' (leather pad with a handle), thickly coated with ink, is rubbed over the surface of the plate until the depressions are well filled with ink. The surface is then rubbed clean, the paper is placed in contact with the plate and put into a cylinder press. The process is superior to all others for giving great density of color in the dark parts of the plate and variety and contrast in the lighter tints. Music may be set up in type and printed as letterpress, but the finest music is engraved on a metal plate.

**THREE-COLOR WORK OR TRICHIROMATIC PRINTING.**—Fully-colored pictures may now be reproduced in three printings from three plates printing yellow, red, and blue respectively. (For the preparation of these plates, see **PROCESS WORK**). The most successful fast color-printing press is an American aluminum rotary, printing seven colors in perfect register. See also **BOOKBINDING**; **COPYRIGHT**; **MAGAZINES**; **PUBLISHING** and **BOOKSELLING**.

**Printing Ink**, an ink made from oils or varnishes, mixed with lampblack or other pigments, and thereafter thoroughly milled or ground through steel, granite, or porcelain roller mills. The principal oils used are linseed, poppyseed, hempseed, resin, and mineral oils. The two last, after being refined and purified with steam, are chiefly mixed with ordinary lampblack; and this

compound, after careful grinding, is suitable for newspapers, the paper for this class of work being usually of such an absorbent nature that a better quality of varnish is unnecessary. For book work and magazines, where high-class illustrations such as line and process plates are employed, a totally different varnish must be used, the paper having a different texture and finish, and the ink used must here depend more upon surface drying than upon absorption. To this end the so-called drying oils are employed in the varnish. Linseed oil has been found to give the most reliable results.

In the manufacture of colored inks chemical knowledge is necessary, so that the chemicals employed in the manufacture of the pigment or varnish do not react upon each other. Lithographic inks, black and colored, are prepared from carefully selected varnishes, and contain a much larger percentage of pigment than letterpress inks.

**Prints**, designs or pictures placed on paper or a similar substance by means of pressure, usually in a printing press. Prints are produced in three ways: relief processes, intaglio processes, and planographic processes. The relief processes comprise woodcuts and wood engravings. Intaglio processes comprise engraving, dry point, mezzotinting, and etching (see ENGRAVING; ETCHING). Planographic processes comprise lithography, which is based wholly on chemical and physical action. The charm and value of a print lies essentially in the quality of line peculiar to the process employed in its making, something which cannot be reproduced in the ordinary process of wholesale printing. The subject of Japanese prints forms a study in itself (see JAPANESE ART). Consult Richter's *Prints: A Brief Review of their Technique and History* (1914).

**Prior, Matthew** (1664-1721), English poet, was born probably in Wimborne, Dorsetshire. Of his works Prior himself regarded with most favor *Solomon on the Vanity of the World*; but his only other long work, *Alma, or the Progress of the Mind*, a poem in the Hudibrastic manner, has generally been preferred. His greatness as an artist, however, is most clearly shown in his shorter pieces such as the *Lines written in Mezaray's History of France*, and his verses to children.

**Priory**, a monastic community governed by a prior or prioress. Simple or obediatory priories are dependent upon abbeys, either paying a yearly tribute or yielding their revenues entirely to the superior order. Con-

ventual priories are autonomous houses which have no abbots. See MONASTERY.

**Pripet**, or **Pripyat**, river, West Russia, one of the chief tributaries of the Dnieper. Its course of nearly 500 m. crosses a vast marshy district estimated to cover over 30,000 sq. m., of which over 22,000 have been drained and reclaimed by the Russian government. In the early part of the Great War it was the scene of several engagements in the vicinity and in February, 1918, an armed flotilla on its waters was captured by the German forces.

**Priscianus**, Roman grammarian, was born probably in Caesarea, about 500 A.D., and taught at Constantinople. His Latin grammar was a standard work, and all subsequent grammars have been based on it.

**Prism**, a solid figure whose ends or bases are two identically equal polygons lying in parallel planes, their corresponding sides being joined by parallelograms. The prism is triangular, quadrangular, etc., according to the form of the bases.

**Prisoners of War**. An officer or soldier who is captured or who surrenders must be given quarter, and is entitled to be adjudged a prisoner of war. He must be treated with humanity, and his personal property, excluding arms, horses, and military papers, must be protected. Wages may be devoted to improving the prisoner's condition. He cannot be required to engage in military operations against his own country. The captor may lawfully shoot the prisoner who attempts to escape while engaged in the act, but he cannot punish him afterward for the attempt. A prisoner is required to state his true name and rank, but cannot be required to give any other information which might prove of value to the enemy. All civilized nations signed the Hague Convention of 1907, which provided rules for treatment of prisoners. After the conclusion of peace the repatriation of prisoners of war takes place as speedily as possible.

**Prisons**. Prisons and dungeons are mentioned in the Hebrew Bible and in other ancient writings, showing that they must have existed in some form from earliest times. They were probably used at first for prisoners of war or enemies of the government till released by death or otherwise.

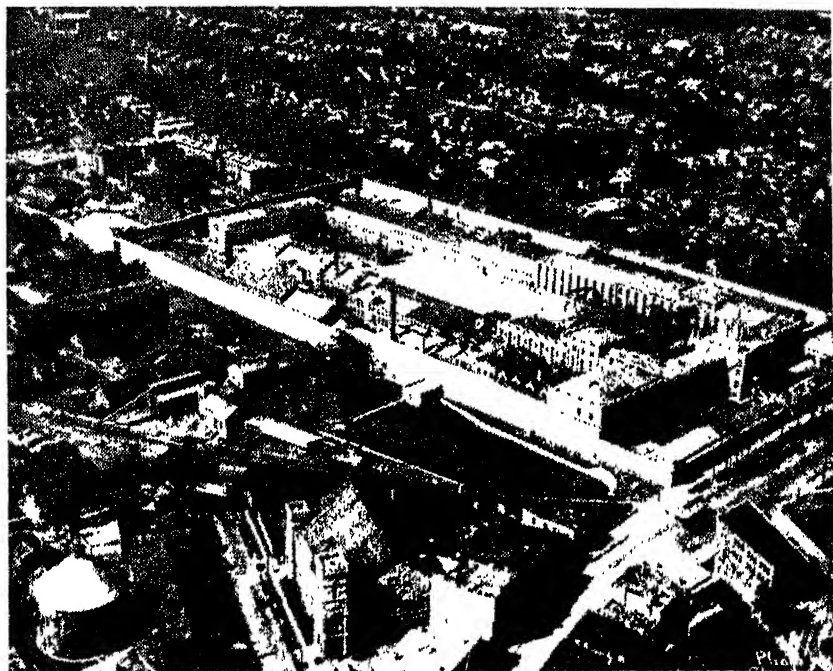
In 1769 John Howard of England began his ceaseless labors and journeys in behalf of prisons and prisoners, which brought about improvements in his own country and on the Continent. The most widespread



improvement in prisons took place in England after the change of law, in 1878, which placed all prisoners under state control and made prison administration uniform throughout Great Britain. The State of New York built a prison at Auburn in 1816, and the following year Pennsylvania built one at Philadelphia. These two prisons were destined to give their names to the systems known everywhere as the Auburn and Pennsylvania systems. The Auburn system worked the convicts in community by day and separated them at night, silence being observed. The Pennsylvania system gave to each man a

Albany County Penitentiary. Louis D. Pillsbury, the son of Amos, was superintendent of State prisons in New York for many years. It is said of these three generations of prison reformers that they were 'rated as the best prison keepers in the world.'

Associated with these men at Wethersfield and at Albany was Z. R. Brockway, who afterward made a business success of the industries of short-term prisoners. The reformatory at Elmira, known throughout the world for its excellent discipline, was established in 1876, and Mr. Brockway for a quarter of a century was at the head of it.



*State Prison, Auburn, N. Y.*

separate cell, with his own exercise yard and work in his cell. Within recent years prisons have been improved in construction as well as in administration, and in the principles on which they are conducted, the result of general advance in science and humanity. The countries which lead in this respect are Great Britain, France, and the United States.

In the United States the pioneer prison reformer was Moses C. Pillsbury. He initiated reform in discipline and made a financial success of prison industries. Later his son Amos inaugurated a similar industrial system for short-sentence prisoners in the

The law establishing the so-called indeterminate sentence was passed in New York in 1877, and it lies at the foundation of the Elmira system, the third American prison system. Since the foundation of the Elmira Reformatory numerous reformatory prisons have been organized in the United States, while the majority of States have adopted an essential reformatory feature—release on parole. The system of putting accused persons on probation, instead of sending them to prison, has been adopted in many places with excellent results where there are wisely selected probation officers to keep track of

probationers. In all prisons certain industries are carried on, varying with different countries and with different parts of large countries. In the United States, for instance, the large prisons of the North engage in manufacturing. In the South, convicts make roads, run turpentine camps, and farm. In World War II, through a special ruling of the Attorney General, State prison industries were converted to war production.

The State of New York has erected an agricultural prison for women, where they are taught farming, gardening, bee culture, dairying, and poultry raising by women.

The places where criminals are held, both before and after sentence, are known by various names. In addition to the rural lock-up and the city police station, to which the prisoner is first taken, there are penal institutions known as houses of correction, work-houses, bridewells, jails, and penitentiaries. The word penitentiary is sometimes used as a synonym for State prison, but in other places, as in New York, it is a county or district prison where misdemeanor prisoners sentenced for short terms are confined, though occasionally felons are imprisoned there. Architecturally there is a great diversity in prisons. The first object being safety, they are massively constructed, the shops and factories being within the walls. Those of the United States, with a few exceptions, have corridors outside the cells, so the sunlight must cross the corridor before reaching the cell. Open-work doors prevent privacy, though giving more access to air and making it easier to guard the prisoners. Modern prisons are supplied with electric lights, baths, good food, libraries, and excellent sanitary arrangements. The effort in the States most alive to reform is to put all convicted prisoners in State institutions and keep jails only for persons detained for trial. The buildings for reformatories are better adapted for their uses than the average prison. They have gymnasiums, school rooms, trade schools, baths, graded dining rooms, and special quarters for the different grades. A chapel is an essential feature in every prison, and in many there are three—Protestant, Roman Catholic, and Jewish. In addition to the warden, superintendent, or governor of a prison, a chaplain, a physician, and instructors are usually attached to the staff. See *CRIMINOLOGY*; *REFORMATORIES*. Consult *Reports of the American Prison Association*; the writings of E. C. and F. H. Wines, Z. R. Brockway, Eugene Smith,

Charlton T. Lewis, Warren F. Spalding, S. J. Barrows, Lewis E. Lawes, also Clark and Eubank's *Lockstep and Corridor*.

**Pritchett, Henry Smith** (1857-1939), U.S. astronomer. In 1897 he became superintendent of the U. S. Coast and Geodetic Survey. In 1900 he was appointed president of the Massachusetts Institute of Technology, resigning in 1906 to become the head of the Carnegie Foundation, where he remained until 1930; later becoming *pres. emeritus*.

**Private.** All men belonging to the United States army who have not attained the grade of non-commissioned officers are termed 'privates' after they are taken up for regular duty with their organization, before which time they are called recruits. See *ARMY OF THE UNITED STATES*.

**Privateering, Privateers**, vessels of war armed and equipped by private individuals and furnished with a commission or license, known as, 'letters of marque,' from the state, to cruise against the shipping of the enemy. The commission placed the privateer practically on the footing of a man-of-war, and allowed the owners to keep the prizes which they took, also granting them a certain sum for every man of the enemy taken or destroyed. The practice of privateering grew up in the 15th century, and until the middle of the 19th century was generally employed by naval powers. By the Declaration of Paris, in 1856, privateering was abolished so far as the powers signatory were concerned; and in wars conducted since then, even by non-signatory powers, no letters of marque have been issued. See *LETTERS OF MARQUE*; *HAGUE PEACE CONFERENCE*. Consult Statham's *Privateers and Privateering* (1910).

**Privet**, the popular name of several species of hardy shrubs and small trees belonging to the genus *Ligustrum* (Oleaceæ). Their chief value lies in their use for hedges, as they stand shearing remarkably well. The Japanese privet (*L. ovalifolium*)—mis-called California privet—is preferable for hedge purposes, especially along the seacoast.

**Privilege.** In law this term is used to denote: (1) certain fundamental political rights enjoyed by all citizens; (2) the exemption from certain legal or political duties or burdens enjoyed by a limited number of citizens.

**Privy Council** in Britain is nominally an assembly of advisers to the sovereign on matters of state. At earlier periods of English history it exercised large powers, but it ceased to exercise its ancient functions when

the principles of government by cabinet became firmly established.

**Privy Seal.** A seal of the English government which is affixed to documents not requiring the Great Seal. See SEAL.

**Prize Fighting.** See BOXING.

**Prize Money,** in the navy, is the money resulting from the capture of an enemy's property at sea and delivery to the government. If the prize is lost or destroyed, the captors receive only a bounty. In 1899 all provisions of law authorizing the distribution of prize money or the payment of bounty were repealed. See PRIZE OF WAR. Consult Oppenheim's *International Law* (1905-6).

**Prize of War** is property captured by a belligerent at sea, either from vessels of the hostile nation or from vessels violating neutrality, or from subject vessels having dealings with the enemy. Down to the middle of the 19th century not only enemy ships and enemy goods, but neutral goods in enemy ships and neutral ships carrying enemy goods were often made prize of war. The Declaration of Paris established the rule, now generally followed by non-signatory powers, that the neutral flag covers enemy goods except those contraband of war; and that, with the same exception, neutral goods in enemy ships are exempt from seizure. (See CONTRABAND OF WAR.) The right to prize is determined by a prize court according to the rules of international law, in the absence of provisions in the municipal law governing such courts.

**Proa, or Prau,** a boat used by the natives of the Ladrone Islands and other islands in the Malay Archipelago and the China Sea. One side of the boat is round or bilge shaped, while the other is flat and perpendicular. It is also fitted with an outrigger. The sail is triangular or lateen shaped and of great size.

**Probabilism,** a doctrine of Roman Catholic ethics, developed mainly by Jesuit theologians. It is an application of the juridical axiom that a doubtful law is not binding, and is to the effect that when there exists a theoretical doubt or controversy as to the obligation of a moral law in a given case, one may safely follow in practice a truly probable opinion against the law, even though the opposite opinion be more probable.

**Probabilities, Chances, or the Theory of Averages.** To assign a number which measures the probability of a future event may at first seem impossible; and yet the

whole business of many large insurance companies is mainly based upon the methods of assigning such a number. When it is certain that a future event will take place, or will not take place, a fixed number is selected for each case to indicate that then the probability amounts to certainty; and these two measures are the limits of our scale. Will the sun rise to-morrow morning in the east? Probability = 1, certainty in favor. Will full moon be seen to-morrow morning in the east? Probability = 0, certainty against. Between these two limiting numbers, 0 and 1, lies the number (a proper fraction) which measures the probability of any undecided event. An important extension of the theory is that the probability of two independent events both occurring is measured by the product of their separate probabilities. The most important of all the applications of the theory of probability is in the calculation of life insurances and annuities. During the early part of the 18th century the celebrated London mathematician De Moivre constructed a formula of great simplicity which is still available, although largely superseded by elaborate 'tables of mortality' which have since been compiled in all commercial countries. Some of the higher applications of the doctrine of probability require a knowledge of the infinitesimal calculus, and are of interest only to experts.

**Probang,** in surgery, an instrument used to force foreign bodies into the stomach when they are fixed in the esophagus so as to cause choking.

**Probate,** the proof of a will before a proper court. Upon the death of a person leaving a will, it is the duty of the person or persons therein named as executors to offer the will for probate. In most of the United States separate courts, known as Surrogate's or Probate Courts, are maintained for this purpose. When the will is offered, a citation or notice is issued, directed to all the heirs and next of kin of the deceased who would have taken his property if he had died intestate, announcing the day on which the will is to be probated, if no objection is made. On the day mentioned, the parties thus cited, or any of them, may appear and object to the probate of the will on various grounds. If no objections are interposed to the probate, or if the objections are finally dismissed and the will declared a valid instrument, it is admitted to probate. See ADMINISTRATOR; EXECUTOR; WILL.

**Probate Court** is a tribunal exercising jur-

isdiction in questions relating to the probate of wills, the administration of property left by intestates, the management of testamentary trusts, the guardianship of infants, and similar matters. A Probate Judge is commonly called a Surrogate, and in some States the tribunal itself is known as a Surrogate's court. See **COURTS**; **SURROGATES**.

**Probation**, a plan whereby adults who have been convicted of crime or children who have been declared delinquent are set at liberty by the court, without confinement in a prison or reformatory, under the watch-care and supervision of a probation officer, who occupies the position of a friendly guardian or adviser, and who is responsible to the court for the good conduct and reformatory progress of the probationer.

The probation of adults was first established by law in Massachusetts in 1878. All of these laws are established on the theory that the reformation of the criminal is the most effective protection to society, and that in the early stages of criminality, reformation is much more probable if the individual is allowed to live under normal circumstances, with the advice and guidance of a probation officer, than if he is placed in the abnormal conditions of prison life, and then turned loose with the handicap of a jail bird's reputation. As in the case of adult probation, juvenile probation was tried out for twenty years in Massachusetts before it was adopted by other States. In the early days of probation, both adult and juvenile, the idea prevailed that almost any one would do for a probation officer. In recent years, however, there has been a gradual recognition of the fact that high character, fidelity, good sense, and knowledge of human nature are essential qualifications, and there has been a steady advance in the quality of the service. The work of probation for women and girls is more difficult than that for men and boys. Nearly all of those who are brought into court have had an immoral experience, and the problem is not an easy one. The difficulty is increased by the defective mentality of a large portion of the female probationers—probably 20 to 25 per cent. It goes without saying that women and girls must have women probation officers, who should be of unusual wisdom, patience, and tact.

**Probation After Death**, a theological doctrine according to which the gospel is preached to men after death, and they are placed on trial either for a stated time or

until they shall have accepted salvation. The idea of probation is not to be confused with that of purgatory, the object of which is the purification of the faithful after death.

**Probationer**, one who is on probation.

**Problems**, in mathematics, are propositions in which some operation or construction is required, or in which a proof of some statement is demanded.

**Proboscidea**. See **Elephant**.

**Proboscis Monkey** (*Nasalis larvatus*), or **Nose Ape**, a monkey nearly related to the langur, but found only in the island of Borneo. The special peculiarity is the great elongation of the flexible nose of the adult male, which reaches the proportions of a proboscis.

**Probus, Marcus Aurelius** (d. 82), emperor of Rome, was born in Sirmium, Pannonia. By the Emperor Tacitus he was appointed governor of the Asiatic possessions of Rome; and on the death of Tacitus he assumed the purple, and was enthusiastically hailed emperor by all classes (276 A.D.). He defeated the Goths, quelled the robbers of Isauria, and made peace with the Persians at their request.

**Procedure**, a general term denoting the methods of proceeding and carrying on an action at law, from its commencement to final judgment and final process thereon, including the rules of pleading, evidence, and general practice. The term is more commonly used, however, to designate the various steps in an action; the rules of evidence and pleading being important subjects in themselves. The procedure in actions varies considerably as to forms and details in the different States of the United States; but certain essential steps are common in all. The common law system of pleading and practice, as it existed and was enforced in the original thirteen colonies, prevails in the various courts of the United States and in many States, with modifications.

The first step is the issuance and service of process notifying the defendant of the commencement of the action. The defendant should enter his appearance by service of a notice on the plaintiff's attorney or filing it with the clerk of court, or file or serve a written answer or demurrer. If he defaults the plaintiff may enter judgment, either with or without leave of court, according to the nature of the case. If an answer or demurrer is served or filed, the case is then at issue, and either party may have it placed upon the calendar of the proper court. The cause

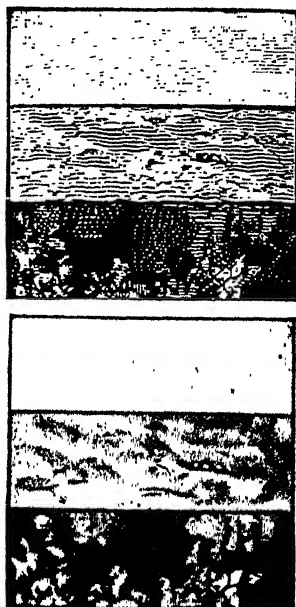
is usually given a number and awaits its turn in being reached for trial. Meanwhile, certain motions relating to the pleadings may be made; to make them more definite, or for a bill of particulars of the claim. The trial is usually before a judge and jury if issues of fact are involved, or before a judge only if an issue of law is raised by a demurrer, or if it is an equity case. After verdict a motion for a new trial may be made, and an appeal taken from the ruling of the court if adverse. In most states there are at least two appellate courts to which a case may be taken; one, of course, being higher than the other. If a judgment rendered in a trial court is reversed by an appellate court, it is usually sent back for a new trial. If the judgment is sustained, the final process of execution is generally issued to collect the judgment, or if it is an injunction it is made permanent. See PLEA; PLEADING. Consult Martin, *Civil Procedure at Common Law*; Pomeroy, *Code Remedies*.

**Process.** A general term including all writs, summons, warrants, subpoenas, and other mandates of a court, which may be executed by an officer of the court, or any person specially authorized by a court or judicial officer. See PLEADING; PROCEDURE.

**Processions** occupied an important position in the worship of the mediæval church, as they do at the present time in the Church of Rome. St. Chrysostom is credited with the introduction of ecclesiastical processions, at Constantinople in 398, in opposition to certain Arian demonstrations.

**Process Work** is the name given to the modern chemical and mechanical methods of preparing surfaces for printing designs and illustrations. Almost all process work is primarily dependent upon photography. With its assistance process work produces surfaces of the three kinds used in printing—*viz.* raised or relief surface, level or planographic surface, depressed or intaglio surface. For the reproduction of designs and illustrations process has largely superseded hand work. It is divided into two main branches—the reproduction of subjects in 'black and white', *i.e.* solid black designs on a white ground, and of subjects in 'light and shade', such as photographs and wash drawings, containing not only solid black and pure white but many intermediate gray tints. The former class is the easier. 'Light-and-shade' reproductions are more difficult. It is obvious that black ink applied all over a printing surface cannot print the innumera-

able gray tints which make up the light and shade of a picture. It is possible, however, to give the effect of tints by printing masses of black through which the white paper is allowed to appear in varying proportions. In photogravure, and in other intaglio processes, also, the tints are produced by the action of more or less light on a chemical skin with which the printing surface is coated. The ordinary process used for reproducing photographs or wash drawings (called 'half-



Light, medium and dark tints as obtained by wood engraving (Upper) and half-tone process (Lower).

tone') proceeds on an entirely different and still more ingenious method. The negative is made through a ruled screen of glass, and in the process of photography this screen breaks up the tints of the original into dots and lines of such a size and at such a distance from each other as to give the effect of tints of the depth required. The processes generally used for 'black-and-white' work can also produce tints. In addition to photography, process work depends on the action of light on a film of gelatin or similar substance when treated with bichromate of potash, and on the mordant or biting action of acids on various metals. Photo-lithography (the parent of all process) is the process of making photo-

graphic prints of 'black-and-white' subjects on paper coated with sensitized gelatin, inking these prints, and transferring them to the lithographic stone. In this way much copying of designs by hand drawing upon the stone was avoided.

**Line-etching.**—The last process led naturally to line-etching. Line-etching has displaced every other process for the cheap and rapid reproduction of designs which do not contain light and shade. As in photolithography, a light-and-shade effect can be secured, provided that the original itself contains that effect in lines or dots—not in washes. The line-etching process has now been improved by printing from the negative direct on the zinc plate, instead of printing on paper and transferring to zinc.

The half-tone process faithfully reproduces light and shade in a copper block suitable for *raised* printing. The discovery of 'half-tone' is the chief cause of the great increase of illustration in books and magazines. The printing and the biting of the zinc plate are the same as in line-etching. Process was early applied to the production by photography and etching of metal surfaces for depressed or intaglio printing. In this group of processes the design must be bitten away instead of being left in relief, so the photographic printing of the plate must be done from a *positive* or reverse negative. A similar process called rotogravure was brought out in the United States in 1912. In this process illustrations with accompanying text are etched on copper cylinders and printed on a rotary machine. This prints both sides of the paper simultaneously at a speed of 3,000 impressions per hour. This process is used extensively in newspaper art supplements and illustrated weeklies.

The latest development has been the invention of three-color process work, by which fully-colored pictures are placed on the photographer's screen, and three negatives made through different colored glasses placed in front of the camera lens. Each of these negatives is then used for making a half-tone block, and the three blocks—printed in yellow, red, and blue respectively, one above the other—produce a faithful representation of the original. See *Verfasser's Half-tone Process* (3d ed. 1904), Von Hübl's *Three-color Photography*, Jenkin's *Manual of Photo-engraving*.

**Procida**, isl., Italy, w. of Gulf of Naples, 2 m. from mainland. It is of volcanic origin. The capital of same name, also known as

Sancio Cattolico, has a good harbor. The island was formerly owned by John of Procida, the chief instigator of the Sicilian Vespers; p. 14,440.

**Proclamation.** The announcement of some state matter or law to the public, usually by the chief executive of a nation, state, or municipality. It is generally confined to the announcement of some executive act, as the fixing of a day for general thanksgiving. See **STATUTE**.

**Proclus** (412-485), a philosopher of the Neo-Platonic school, was a native of Constantinople, but spent most of his life at Athens. In philosophy he attempted to blend Aristotle's logic with the Neo-Platonic speculations. The most important of his works are commentaries on the *Timæus* and other works of Plato.

**Procne.** See **Philomela**.

**Proconsul**, in ancient Rome, a consul who had his power prolonged beyond his ordinary year of office, which practice arose in 327 B.C., from the necessity of keeping several armies in the field and prolonging the command of a victorious general. A proconsul was supreme in his province, and carried on war on his own authority.

**Procop, Andrew** (c. 1380-1434), a Bohemian monk, who went over to the Hussites, and after the death of Ziska (1424) became leader of the Taborites, the more fanatical party of that sect. He wrought great havoc among the towns and villages of Austria, Silesia, Saxony, and Franconia, and defeated several 'crusading' imperialist armies that were sent against him, especially at Taus in 1431.

**Procrustes**, in ancient Greek legend, a robber of Attica, whose real name was Polypepon or Damastes. He invited strangers to his house, and then forced them into a bed; if they were too tall for it, he hewed off their limbs; if too short, he stretched them until they died.

**Procter, Bryan Waller** (1787-1874), English poet and biographer, born at Leeds. Procter wrote under the pseudonym 'Barry Cornwall,' an imperfect anagram of his name. His *Poetical Works* have had a wide circulation in the U. S. as well as in England.

**Proctor.** The name applied to an attorney in ecclesiastical and admiralty courts in England and in admiralty courts in the United States. See **ATTORNEY**.

**Proctor, Richard Anthony** (1837-88), English astronomer, born in Chelsea, Lon-

don. He lectured in 1884 and 1887, and removed with his family in the latter year to Florida. Proctor's researches into the theory of the solar corona and the rotation period of Mars proved of great value. His numerous works, ably and lucidly written, include *Saturn and his System* (1865), *Half-hours with the Stars* (1887), and *The Orbs Around Us* (1872).

**Procurator.** The name commonly used in Glasgow and the surrounding districts for a law-agent or solicitor.

**Procurator Fiscal** (Scots law), a public prosecutor.

**Procyon**, the Lesser Dog-star, = *a Canis Minoris*, a star of 0.48 magnitude, with a spectrum intermediate between those of Sirius and of the sun. The bright star is five times more luminous than the sun.

**Prodicus**, ancient Greek sophist, was a native of Ceos, and lived probably from about 480 to a little after 400 B.C. He appears prominently in Plato's *Protagoras*.

**Professor.** A title among the Romans applied to public teachers of grammar and rhetoric, and in the universities of the middle ages synonymous with *doctor* or *magistrate*. In the modern university the professor is the head instructor in a department, responsible for its conduct, and holding a seat in the faculty. With the growth of the colleges, the ranks of adjunct, assistant, and associate professor have been created, differentiated by their responsibilities and functions from tutors, assistants and instructors, who usually have no voice in the management of the department.

**Profit à Prendre.** A right to enter on the land of another, and to take some profit from it. It may be a right incident to the ownership of land, or it may be held in gross without any estate to support it. It may be created by prescription. See EASEMENT; consult Jones, *Easements*.

**Profits**, according to common usage, denote comprehensively the return obtained from business enterprise, after deduction of the gross expenses. Adam Smith, writing before the industrial revolution, naturally regarded profits as varying strictly according to the amount of stock or capital employed, and as wholly distinct from the wages of inspection and direction. It was no less natural that the American economist, F. A. Walker, writing toward the end of the 19th century, should wish to confine the term profits to the reward for the work of the employer as such, and to establish a rigid

distinction between the remuneration for business enterprise and interest on the capital used. J. S. Mill, on the other hand, whose book appeared in the middle of the 19th century, stated that there were three component elements in profits, which were interest on capital, insurance against risk, and wages of superintendence, or earnings of management. Recent studies in economic theory distinguish another element in profits, *rent*, the gains that accrue to certain employers through the introduction to new methods, or through sudden expansion of the demand for goods. Profits from such sources are temporary in their nature, the general adoption of improvements, with the resultant fall in prices, reducing profits to a minimum. See CAPITAL; INTEREST; MONOPOLIES; PROFIT SHARING.

Consult Walker's *Wages Question*; Bagehot's *Economic Studies*; Clark's *Distribution of Wealth*; Carver's *Distribution of Wealth*; Seligman's *Principles of Economics*; Epstein & Clark, *Source-Book for the Study of Industrial Profits* (U. S. Dept. Com., 1932); A. B. Adams, *Profits, Progress and Prosperity* (1927); Fairchild, *Profits or Prosperity?* (1932).

**Profit Sharing**, a modification of the wage system, under which the workman receives, in addition to ordinary wages, a stipulated proportion of the profits of the enterprise. In true profit sharing the amount to be distributed varies with and depends upon the net profits or upon the amount of dividends paid to stockholders; the proportion of profits to be distributed is definitely determined in advance; the benefits of the plan are extended to at least one-third of the total number of employees, and employees other than executive and clerical are included; and the method of determining individual shares is known, at least in a general way, to the participating employees.

The term Profit Sharing is also applied, though less correctly, to plans whereby the profits are shared with less than one-third of the total persons employed. As a rule, the distribution among the several employees is in proportion to the annual wage received by each. In the earlier profit-sharing experiments, the dividend to labor was made in the form of a cash payment or bonus; and this form is still largely employed. However, many profit sharing firms have adopted the policy of crediting a bonus to the workman, to be withdrawn by him only after a stated period of service. In the plan most favored

by employers, the dividend to labor is declared at stated periods, but in the form of stock in the company. In a study made by the Metropolitan Life Insurance Company (1926-27), it appeared that out of 87 firms in United States, Canada and England which had had experience with profit sharing, 15 had discontinued it and 72 had survived dull periods. Most executives who replied to the questionnaire found the system satisfactory as tending to stabilize the working forces, prevent strikes and eliminate waste.

The chief arguments brought forward against the system by employers, besides its failure to secure increased efficiency, are that competitive conditions usually preclude the long continuance of any profit in excess of a fair return on capital, and that it is unjust for labor to share in the profits when it does not share in the loss or risk of the business. Profit sharing is not favored by leaders of organized labor for these reasons: The workers have no voice in the management; they cannot check the accuracy of profit reports; it is an unstable factor in industrial life, subject to change at employers' whims; to modification or abolition with change of management, death of employer, or dissolution of the business. Above all, it is designed to keep wages down, arrest the militancy of the workers, and halt the advance of trade unionism. Modern profit sharing may be said to have originated in France about the middle of the 19th century. The greatest success in England has been encountered in the gas business, where only one out of 34 plans put into operation failed.

Profit sharing in the United States is a comparatively late development. In 1867 the Bay State Shoe and Leather Company of Worcester, Mass., began the division of 25 per cent. of the net profits to its employees, continuing until 1873, when a strike for higher wages caused its abandonment. In 1923 there were 100 profit sharing concerns, but since the depression from 1929 many firms were compelled to abandon the scheme.

The U. S. Steel Corporation adopted its plan of profit sharing in 1903. Only the higher class employees—those upon whose faithful performance of duties the successful operation of the works depends—are allowed to participate. The plan of the Ford Motor Works was introduced in 1914, and involves the distribution to over 25,000 employees of one-half the estimated net annual profits to be added to the usual wages in the form of

a bonus. See BONUS; CO-OPERATION; OLD-AGE PENSIONS; INSURANCE, INDUSTRIAL.

**Programme Music** comprises that class of musical composition which depends for its effect upon the literary scheme or programme on which it is based. While pure or absolute music develops organically from the inherent qualities of musical expression, programme music requires the accompaniment of the 'book'—e.g., the *Don Quixote* of Richard Strauss. The term is also applied to compositions of concert-hall scope, as distinguished from music dramas and operas.

**Progreso**, seaport town, Mexico, the principal port of entry and centre of distribution for the state of Yucatan; 25 m. n. of Mérida; p. 5,000.

**Progression**, in mathematics. See **Series**.

**Progression**, in music, is applied to the changes from note to note in melody; to the succession of chords in harmony; and to the motion of parts in compositions of a contrapuntal nature. See COUNTERPOINT; HARMONY.

**Progressive Party**, an American political party formed in 1912 to secure direct popular control of elections and legislation in the States and nation; to bring within Federal jurisdiction problems too difficult to be dealt with by individual States, to establish a strong national regulation of interstate corporations, and, broadly speaking, a larger measure of social and industrial justice.

The Progressive Party had its immediate origin in the Republican National Convention held in Chicago June 18-23, 1912, in a controversy between the adherents of former President Theodore Roosevelt and of President William H. Taft, candidates for the Presidential nomination. In the Convention, the decision of the National Committee in seating a large number of contested delegates resulted in the exclusion of many Roosevelt supporters, and Taft was renominated by a vote of 561 to 107—344 delegates signifying their disapproval of the action of the Committee by refusing to vote.

On June 22, 1912, a number of the Roosevelt delegates held an independent meeting in Chicago, and laid the foundation for the formation of the Progressive Party. On August 5, the first National Progressive Convention met in Chicago, in response to a call issued by 63 well-known men from 40 States. Theodore Roosevelt of New York was nominated for President, and Governor Hiram Johnson of California for Vice-Presi-



dent. In the Presidential elections of 1912, the total popular vote for the three leading candidates was 13,879,142. Of this number, Roosevelt received 4,106,247, as compared with 6,291,776 for Woodrow Wilson, the successful Democratic candidate, and 3,481,119 for William H. Taft, the Republican candidate for re-election.

The State elections of 1914 revealed a considerable decline in power of the Progressive Party, and a movement for reunion with the Republican Party was inaugurated. In 1916 the Progressive Committee endorsed the candidacy of Mr. Hughes, in accordance with the expressed wishes of Colonel Roosevelt.

See UNITED STATES, *History*; REPUBLICAN PARTY.

**Prohibition**, in law, is a writ issued by a superior court, directed to the judge and parties at action in a court of inferior jurisdiction, requiring them to stop immediately the prosecution of the action or proceeding. The writ is granted only where the inferior court has exceeded, or threatens to exceed, its jurisdiction.

**Prohibition**, the policy of prohibiting by law the sale and manufacture of alcoholic beverages. In the United States, the first prohibitory law was enacted in Maine in 1846. About 1880 the movement spread to the Middle West; at the opening of the 20th century it invaded the Southern States; and in more recent years many of the Western States entered the prohibition list. On Jan. 1, 1919, the following States and territories had full prohibition: Alaska and Porto Rico, Alabama, Arizona, Arkansas, Colorado, District of Columbia, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Maine, Michigan, Minnesota (effective 1920), Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Carolina, North Dakota, Ohio (effective May 20, 1919), Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wyoming (effective Jan. 1, 1920).

With the establishment of the Parcels Post, in 1911, a movement began in Congress for the protection of the 'dry' States, and a bill was passed forbidding consignments of liquor from any State to an individual residing in another State, and making all shipments of liquor subject to the police power of the State at the border line. On July 1, 1917, no less than 23 States became 'bone dry' when the Reed Amendment to the Post Office Appropriation bill went into effect, prohibiting

the shipment of liquor into any territory where its manufacture or sale is prohibited; while 11 other States were partially affected. Two Federal prohibition enactments were the direct outgrowth of conditions during the World War (1914-18). The *Food Control Act* forbade the use, after Sept. 8, 1917, of food materials in the production of distilled spirits for beverage purposes, and empowered the President to place similar restrictions on the manufacture of malt and vinous liquors (see *FOOD CONTROL*). The Emergency Agricultural Appropriation Act, for stimulating agricultural production, signed by President Wilson, Nov. 18, 1918, carried a *War-time Prohibition* rider providing for nation-wide prohibition of the manufacture and sale of intoxicating drinks from July 1, 1919, until after the signing of peace and the complete demobilization of the army.

On Aug. 1, 1917, the U. S. Senate by a vote of 65 to 20 passed the Sheppard resolution calling for a vote of the legislatures of the 48 States upon a constitutional amendment for nation-wide prohibition. By Jan. 16, 1919, the proposed amendment had been ratified by 36 States. On Jan. 20, it was accordingly proclaimed by the Acting Secretary of State, Frank L. Polk, a valid part of the Constitution of the United States. Subsequently ten more States voted for ratification.

The terms of the Amendment made it effective one year from ratification, but since the Wartime Prohibition Act went into force July 1, 1919, national prohibition in the United States may be said to date from that time. The Volstead Act, giving Congress power to enforce the measure, became effective Jan. 16, 1920. According to the Volstead Act, 'liquor,' or 'intoxicating liquor,' was defined as including 'alcohol, brandy, whisky, rum, gin, beer, ale, porter, and wine, and in addition thereto any spirituous, vinous, malt, or fermented liquor, liquids, and compounds, containing one-half of one per centum, or more, of alcohol by volume, which are fit for use for beverage purposes.' The Volstead Act further defined the terms of the amendment; provided for certain exemptions, including wine for sacramental purposes, patent medicines, toilet preparations, etc., made provision for the granting of permits for the legitimate use of intoxicating liquors; and entrusted the investigation of violations of the Amendment to 'the Commissioner of Internal Revenue, his assistant, agent, and inspectors,' such violations to be reported to the U. S. Attorney for the district in which

committed, who was charged with the duty of prosecuting the offenders.

In order to carry out this last provision there was created in the Bureau of Internal Revenue a special organization, known as the Prohibition Enforcement Unit, under a Prohibition Commissioner, subordinate to the Commissioner of Internal Revenue, who in turn was subject to the Secretary of the Treasury. On April 30, 1924, the U. S. Supreme Court handed down a decision that the 18th Amendment and the National Prohibition (Volstead) Act applied to all merchant vessels, both domestic and foreign, when within the territorial waters of the United States, except in transit through the Panama Canal, and they did not apply to domestic vessels when beyond these waters.

The chief obstacle to prohibition in the past was the widely prevailing idea that it is hostile to the purpose of the Constitution and the ethics of personal liberty. Another argument adopted against its being carried into effect was that prohibition is the parent of illicit liquor traffic and enormously aggravates the drink evil. Still another was the loss of that enormous revenue from the sale of intoxicants by which many public institutions of social, charitable, and educational utility are maintained or greatly aided.

Over against these criticisms the advocates of prohibition asserted that neither the makers nor sellers of beer and other intoxicants provide such revenue; that it comes out of consumers, who by their consumption are made non-producers to a burdensome extent; that pauperism, crime, and vice are the direct result of such consumption; and that these cost the taxpayers many times more than any sum the liquor traffic ever claims to pay. Regardless of the controversial theoretical aspects of prohibition, the national government prosecuted its enforcement with a rigor temporized only by the extent of its available funds, but a success contingent in large measure on a varying local receptivity.

The prohibition years, however, were by no means arid. Considered as more than a joke was the common remark that 'Prohibition is better than no liquor.' The 'better' was none too good: home brew, flavoring extracts, bay rum, hair tonics, a variety of medicinal preparations, and alcohol of questionable genealogy (as well as industrial alcohol rendered, in theory, impotent and even poisoned by the government) caused, by their induction, many deaths, and many cases of blindness. After 1924 the chief sup-

ply came from diverted industrial alcohol. In 1926, it was estimated, 60,000,000 gallons were so diverted, for the delectation of 'speakeasy' patrons or home bibbers, in the form either of 'cut' or synthetic liquor. The profits from this eventually highly organized trade in illegal liquor, and from illicit brewing and distilling, enabled a large criminal element to extend their operations to many equally well developed rackets.

A comprehensive survey of the prohibition situation was contained in the final report of the Wickersham Commission, presented to President Hoover on Jan. 19, 1931. The commission, read the report, was opposed to repeal of the Eighteenth Amendment, to return of the saloon, to the Federal or State governments' going into the liquor business, to legalization of beer and wines. Some of the commission favored further trial of the Eighteenth Amendment in its existent form, others considered it to have already been demonstrated as unenforceable; all agreed that if revised it should permit Congress to determine national policy with respect to the liquor traffic (something forbidden by the Constitution).

Public dissatisfaction became manifest from the beginning of the 'dry' era in 1920, and the prohibition experience of the United States ran the same course as it did in all other countries where a similar attempt was made. From about 1907 to 1920 the tide of sentiment seemed to favor, after 1925 it opposed, prohibition. Polls of the *Literary Digest* in 1930 and 1932 further illustrated the popular desire for repeal or reform. Dwight Morrow in 1930 joined the repealists, and many other prominent citizens, notably John D. Rockefeller Jr., followed suit. (For the important political aspects of the prohibition issue see UNITED STATES: *History*.)

The last 'lame-duck' Congress failed to pass beer legislation, in spite of Democratic efforts. It did, however, agree on a resolution for the repeal of the Eighteenth Amendment, which Secretary Stimson on Feb. 21, 1933, submitted to the States for ratification by State conventions to be called for the purpose. In March the restrictions on the prescription of medicinal liquor were withdrawn. On April 7 legalized beer went on sale in nearly half the States.

On April 10 Michigan became the first State to ratify the Twenty-first Amendment. Convention after convention followed this example in a 'wet' march broken only by North and South Carolina; with Utah's

favorable vote, the 36th, on December 5 the Eighteenth Amendment was read out of existence. The return of liquor immediately raised a number of complex problems, such as the manner and division of control by the Federal and State governments, the protection of dry States against the importation of liquor; taxation; the elimination of the bootlegger and the speakeasy; the prevention of the return of the generally unwanted saloon. By the date of repeal several States had already prepared regulations, usually of a liberal nature, for the retail sale and consumption of liquors. Federal control was vested in a newly-created Federal Alcohol Control Administration, headed by Joseph H. Choate Jr. Under the distillers' code signed by President Roosevelt, the FACA could revise the prices fixed by the liquor industry, control production and distribution through a quota system, and hold tight rein over all phases of the industry. Import restrictions and quota system embodied in a marketing agreement with the Department of Agriculture were to control the supply of hard liquor. Thus, in the midst of the travail accompanying the birth of a new one, ended a significant phase of American social life.

Under the Canadian Constitution, jurisdiction in the matter of the control or prohibition of the liquor traffic is divided between the Dominion and the provincial governments and provinces have power to regulate or prohibit the sale of liquor within their own boundaries. In Canada, as in the United States, the prohibition cause was advanced by the war. Provincial prohibition, which had been adopted in Prince Edward Island in 1900 and in Nova Scotia in 1910 was in 1929 abandoned, as the result of popular vote, in favor of government control; New Brunswick, which adopted prohibition in 1917, likewise changed to State control.

In Ontario provincial prohibition was adopted by the legislature in 1916 but in 1927 it was repealed in favor of strict government control of liquor sales under a permit system, with sale in hotels, clubs, or by the glass in drinking establishments forbidden. The government monopoly in all the provinces has made the liquor traffic a source of considerable revenue. Nowhere in Canada is the manufacture of intoxicating liquors prohibited, and exportation by brewers and distillers is nowhere forbidden.

*Other Countries.*—During the World War (1914-18) the drink problem received serious attention from many national govern-

ments. Following the war, Great Britain enacted the Intoxicating Liquor Bill, forbidding the sale of intoxicating liquor to any person under 18 years of age. Northern Ireland and the Isle of Man passed similar intoxicating liquor measures providing for the Sunday closing of liquor shops and setting an age limit for purchasers.

In 1919 Norway adopted partial prohibition under which the sale of beer and wines was permitted. Sweden in a national referendum in 1922 defeated prohibition by a margin of 35,000 votes. Under the Bratt system for restricting the liquor traffic in that country, the Wine and Spirits Central is the only organization having the right to manufacture and sell liquor wholesale. All profits above 5 per cent. from the sale of alcoholic liquors go to the government. Estonia tried prohibition during the World War but subsequently changed to a system like Sweden's. In Finland prohibition, which went into effect in 1919, resulted in conditions much like those in the United States, and was abandoned in 1932 as the result of a referendum in which 70.5 per cent. of the voters demanded repeal. A new law provided for strict governmental regulation, as in Sweden, and set up a corporation which gives permits to manufacture and sells licenses to retailers. Profits of the company (98 per cent. of the stock of which is owned by the government) above a dividend of 7 per cent. go to an old age and unemployment fund, to further temperance work, to the support of cultural and temperance activities in all communities, and (50 per cent.) to defray expenses in the campaign against the illegal liquor trade. The sale, manufacture, and importation of spirits may be prohibited in municipalities by a two-thirds vote of the municipal council concerned.

Prohibition was tried, in many other countries, but when Finland abandoned it in 1932, the United States was the only country still having national prohibition. The example of these last two countries was not of a nature to inspire imitation. Regulations of one sort or another to further temperance, nevertheless, are in effect in most countries, and as a problem for local concern, prohibition continues in many places. See *CRIME; TEMPERANCE; PROHIBITION PARTY.*

*Bibliography.*—G. Hayler, *Prohibition Advance in All Lands* (1914); S. Crowther, *Prohibition and Prosperity* (1930); C. Warburton, *Economic Results of Prohibition* (1932); S. Walker, *Night Club Era* (1933);

R. B. Fosdick and A. Scott, *Toward Liquor Control* (1933).

**Prohibition Cost in U. S. A.**—On Dec. 6, 1933, it was stated by Department of Justice officials in Washington that 92 Federal agents and 178 civilians had been killed in the efforts to enforce national prohibition, and \$128,810,291 spent between Jan. 16, 1920, and Oct. 31, 1933. An earlier report of November estimated the death toll at over the 1,500 mark. In 1931 Senator Mil-lard E. Tydings of Maryland in the Senate put at 1,550 the lives that prohibition had cost until then. His figures did not include deaths from poisoned alcohol.

Convictions for the period 1920-1933 totaled 534,335. Fines amounting to \$80,337,012 were imposed against 494,764 persons. Property seized was valued at \$219,302,464.90 from 1926. The most was seized in 1930—\$29,238,000 worth.

**Prohibition Party.** In the early years of the agitation for prohibition, its advocates showed no disposition to form an independent party, but gave their support to those candidates of other political parties who seemed most favorable to the repression of the liquor traffic. That the same policy is still followed by many of the advocates of prohibition is evident when a comparison is made between the vote of the Prohibition Party at the polls and the long record of anti-liquor legislation.

**Projectiles.** In projectiles there is a movement of the axis similar to that of the earth and of all rotating bodies. In the case of elongated projectiles of approximately cylindrical shape (with one or both ends pointed), considerable information has been obtained. In such projectiles, the point describes a curve about the line of flight which varies with the velocity, the shapes of the head and base, the position of the centre of gravity, and the density. It is most marked in projectiles which have the centre of gravity near or abaft the centre of figure, such as the elongated bullets of small arms. It is least in the projectiles of large guns which have hollow bodies and solid heads. It has a marked effect upon the drift, possibly greater than the frictional resistance, particularly as the velocities of translation and rotation decrease.

**Projection.** The projection of a point on a surface is the point where a line drawn from it according to a fixed law meets the surface, and the projection of a line or figure is the new line or figure formed by the

projection of all the points which compose the original. The methods of projection most commonly used are the *orthogonal*, in which the lines are drawn at right angles to a plane; and the *conical*, in which the lines all meet in a point. The rules of perspective drawing are deduced from the principles of conical projection, lines drawn from the object to the eye being intercepted by the picture plane. In the construction of maps also projection is extensively used, though the term 'projection' is then applied to methods not involving true projection. It is impossible to represent a spherical surface on a plane surface with perfect accuracy, for, however small the parts into which a spherical shell is divided, each retains its spherical form; but if the shell be supposed perfectly elastic, we can imagine it to be stretched out into a plane surface. As the angles and distances cannot be the same on the sphere and on the map, and hence distortion and inequality of area arise, the choice of a projection depends on the purpose for which the map is constructed; for general maps, one in which both distortion and inequality are present, but neither error is excessive is best. Among the various kinds of projections are *stereographic*, *cylindrical*, *conical*, *globular*, etc. In the cylindrical the surface of the sphere is projected on to the cylinder touching it at the equator; the cylinder is then unrolled into a flat surface. The simple form, made by lines drawn from the centre of the sphere, is enormously extended towards the poles, and is of little practical use. The modification introduced by Mercator, however, is of great value. The meridians being projected into straight lines perpendicular to the equator, the degrees of longitude are equal at all latitudes, and consequently the length of a degree of longitude on any parallel is to its length on the sphere in the ratio  $\sec. \text{lat.} : 1$ . Mercator made his distances from the equator increase at every point in this ratio, so that the angles at each point are true (see Herschel, *loc. cit.*, p. 103). A line, then, which makes equal angles with the meridians on the sphere will also make equal angles with them on the projection, and on the latter will be a straight line. Of course the areas in the projection are greatly exaggerated towards the poles, and these are at an infinite distance.

These projections are used for general maps, and most of them for such alone. Others have some special quality. Great circle sailing requires a particular chart, in which

great circles are represented by straight lines, as loxodromes are on Mercator's projection. See MAPS and MAPMAKING.

**Projection of the World.**—This system or process as a whole forms a special branch of the subject demanding methods other than those used for producing national or regional maps or charts of the whole world for a special purpose unattainable by any other method, like Mercator's. Mr. B. J. S. Cahill, a California architect, has devoted 35 years to this task, the outcome of which is the Octahedral System of Projection, popularly known as the Butterfly Map. It is, in reality, not only a single *mappemonde* but a complete system of presenting the surface of our planet on a plane with the very minimum of exaggeration, distortion and interruption. The butterfly form is capable of four arrangements with a repeat octant East and West if desirable as on Mercator's Chart. Many other dispositions of the octants are possible to suit various dynamic needs.

**Proletariat**, the lower classes of the community. In the time of Servius Tullius a *proletarius* was a citizen of the lowest class, who was considered useful in the state only in begetting children (*proles*). In modern socialism the word is applied to the wage-workers collectively.

**Prologue**, usually a short poem or verses sometimes prefixed to new plays to recommend them to the favor of the readers, or spectators—in the comedies of Plautus, Terence, and other poets.

**Prome**, chief town, Prome dist., Lower Burma; exports silk, cotton, rice and sugar; p. 28,295.

**Promethea Moth**, a common large brown silkworm moth of the United States.

**Prometheus**, in ancient Greek mythology, was one of the Titans. Aeschylus regards him as a god, but correctly speaking he is rather a hero. The chief legends about him are that he stole fire from heaven to give to men (for this he was chained by Zeus to a pillar, an eagle coming every day to devour his liver, which grew afresh every night; at last Hercules slew the eagle and released him.)

**Promissory Note**. An unconditional promise in writing, signed by the maker, whereby he agrees to pay on demand, or at a fixed or determinable future time, a certain sum in money to a specified person or order, or to bearer.

**Promotion, Military**, is the advancement of an officer of one grade to a higher grade

in the service. The grades of officers and non-commissioned officers in the United States army range from that of lieutenant-general down to corporal. Officers and non-commissioned officers are generally appointed to the lowest grades and promoted as vacancies occur to the higher grades in succession. Promotions in the line of the army are made by seniority up to and including the grade of colonel; general officers are promoted by selection. Second lieutenants, first lieutenants, and captains are required by law to pass a rigid physical and mental examination to determine their fitness for promotion.

**Pronghorn**. The 'antelope' (*Antilocapra americana*) of the N. American plains stands in a family by itself because of the singular structure and shape of its horns, which make the name *pronghorn* far more appropriate. This animal, which is related by descent to the deer as closely as to the true antelopes, is unlike any other sheathed-horn creature in the way its horns are acquired; in their being branched; and most of all in the fact that they are annually shed and renewed. The pronghorn once ranged in enormous numbers over all the plains and valleys, from the valley of the Saskatchewan s. to central Mexico; but now only scattered remnants remain.

The prong-horn is a denizen of the dry, bunch-grass plains, where it was wont to thrive on the sun-cured nutritious herbage after revelling for a short period each spring on the juicy new pasturage. The speed of the pronghorn exceeds that of any other animal of the American plains, but cannot be maintained for many miles, nor does it seem able or willing to leap over an obstacle more than about three feet high, so that the cattle-rancher's fences have had a great influence in its decrease. Formerly the northern pronghorns gathered in the autumn into vast herds, and moved southward to areas warmer and freer from snow; yet thousands perished annually from exposure and starvation. In 1934 fossil remains of an extinct species were found in a cave in southern Arizona by Quentin Roosevelt and J. W. Burden. This antelope was four horned, at least in appearance.

**Pronunciation**, in its widest sense, is the art of articulate utterance, but is often, as here, taken to mean the art of uttering words with their correct sounds and accents, or as it is specifically called *orthoëpy*. In orthoëpy, as in orthography, the only practical record of what is the best, that is the conventionally

accepted, pronunciation is the dictionaries. For most words both the English and the American dictionaries agree upon essentially the same pronunciations, but, yet, there are many words the English pronunciations of which differ more or less widely from the American, and also there are many variations in pronunciation for which no written directions can be given. In the pronunciation of proper names there is less uniformity than in that of common words, but for names in foreign languages the best usage now is to give as nearly as may be the pronunciation given to the name in the language to which the name belongs, English usage in this respect differing largely from the French and German.

Most of the sounds in foreign languages are fairly well represented by the ordinary English sounds, so that the chief difficulty in a fairly correct pronunciation of foreign words is to know what values are to be given to the letters with which they are spelled.

Although many of the consonant letters of foreign languages have essentially the same values as in English, it is quite impossible to give any general rule that will insure even a tolerably correct pronunciation of foreign names. Loosely, we may say that in foreign languages each vowel is sounded, except in the case of double vowels, which usually make a single long syllable.

In most languages there is a distinctly accented syllable in each word, and this syllable corresponds in most languages, especially the Teutonic ones, to what would be the naturally accented syllable in English. The unaccented syllables are generally more distinctly pronounced than in English, and there is relatively less emphasis on the accented syllable.

The glides of our English vowels, which when exaggerated produce a characteristic drawl, seldom occur in foreign languages, and care should always be taken, therefore, not to drawl or unduly prolong the vowels in foreign words. In a few languages the accent usually follows certain general rules that are helpful enough to be worth stating. In *Arabic* the last long syllable is accented, that is the last syllable having a long vowel or a vowel followed by a consonant in the same syllable, except that a final vowel is not accented. In *Czech* and *Hungarian* the spoken accent is always on the first syllable, the written accent in Hungarian being used only to indicate vowels long in sound. In *French*

there is characteristically no strong syllabic accent, but there is a slight emphasis upon the last syllable. In modern *Greek* the spoken follows the written accent. In *Italian* the accent is usually on the penult, except in words derived from Latin words having the penult short, when the Italian accent is usually on the antepenult. A graphic accent generally denotes an accented syllable, except in case of the acute accent on the letter *i* in the terminations *-ia*, *-ie*, where the graphic accent is used to distinguish words spelled alike. In *Polish* and *Welsh* the penult usually takes the accent. In *Spanish* and *Portuguese* the accent is generally on the last syllable, except when the last syllable ends in a vowel, or when, in Spanish, the last syllable is unaccented and ends in *n* or *s*, in which case the accent is usually on the penult. In *Turkish* the last syllable usually receives a slight emphasis, much as in French. In general in *Japanese* the accent is on the first syllable.

**Proof**, in law, the establishment of facts alleged in the pleadings. Sometimes the word 'proof' is used as synonymous with the evidence itself, and it then means simply competent legal evidence as distinguished from irrelevant and hearsay evidence.

**Proof Spirit**. The legal definition in the U. S. is 'that mixture of alcohol and water which contains one-half of its volume of alcohol, the alcohol, when at a temperature of 60° F., being of specific gravity .7939, refined to water at its maximum density as unity.'

**Proofs, Correction and Reading of**. See **Printing**.

**Propaganda** (*Congregatio de Propaganda Fide*), the most important of the congregations of the Roman curia, and also a missionary college at Rome, constituted for the spread of the faith throughout the world. The congregation was founded by Gregory xv. in 1622.

**Propagation of Plants**. The division of the root-stock is a method applicable to the majority of perennial plants. In the case of most corms and bulbs it is necessary to separate the young bulbels or cormels, and to plant them out in a bed. In the division of the root-stocks of herbaceous plants each plant must include at least one eye or bud, and must usually also be provided with a supply of rootlets. Many plants may be propagated by layering. The carnation is usually propagated in this way, the layering being performed in July, and the young plants being separated a few months later. Roses may be pegged down and layered in a

somewhat similar way, but in their case it is the middle of a branch and not its base which is cut and pegged beneath the soil. Another method by which many plants can be increased is that of cuttage. This is usually employed for chrysanthemums, pansies, and certain other plants. A cut should be made in a slanting direction through the stem to be severed just below a joint. As a rule, cuttings of herbaceous plants should be made in the spring. Some cuttings will root readily in light soil in the open air if a shady position be selected; but usually it is better to plant the cuttings in pots of sandy loam and place them in a hot bed, taking care to shade from the sun until they are rooted.

**Propertius, Sextus**, Roman elegiac poet, was born probably about 50 B.C. at Assisium, now Assisi, in Umbria. He possesses great vigor of passion and of expression; and though his work is unequal, he clearly possesses a more original genius than either of his rivals, Tibullus and Ovid.

**Property.** In the legal sense the rights of control and enjoyment which one may possess in material things. Where one is the absolute owner of a horse it is safe and proper to describe the animal as his property; but where land is held by a tenant for life or years, subject to a reversion or remainder in fee, it would not be accurate to describe the land as the property of either the tenant or the landlord. The truth is that the property of the one is his estate for life or years, while that of the other is his estate in fee simple.

Our classification of property as real and personal is based primarily on the two classes of actions formerly available for the protection of property rights—the real action, which aimed at the restoration of the subject matter of the property *in specie*, being strictly confined to property rights in land; and the personal action, which was aimed at the person interfering with the property, and which was satisfied by a payment of its value, being appropriated to rights in chattels. There is in our law no such thing as the absolute ownership of land by a private individual, but the greatest interest which the subject or citizen can hold in land, the *fee simple* absolute, is only an estate in the land, held in subordination to the superior title of the state, and in legal theory falling far short of absolute ownership. The classification of property as corporeal and incorporeal belongs almost exclusively in the field of real property. The literature of the sub-

ject is extensive and includes Blackstone's *Commentaries on English Law*, Kent's *Commentaries on American Law*, Pollock and Wright, *Essay, on Possession in the Common Law* (Oxford, 1888), and Holland on *Jurisprudence* (10th ed. London and New York, 1906).

**Prophecy.** None of the original Hebrew terms for 'prophet' necessarily contains the idea of prediction. The prophet was a 'forth teller' rather than a 'foreteller,' regarded as a divinely commissioned agent and interpreter of the counsel of the Most High. In the times of Samuel, as later of Elijah and Elisha, there were 'schools of the prophets,' associations where the gift could be nurtured and directed; but from the 8th century onwards the prophet was one who had not been taught of man, but received his call and equipment direct from God. Having the faculty of spiritual insight, they not only proclaimed moral and religious truth, but anticipated the future. See Davidson's *Old Testament Prophecy* (1903).

**Prophylaxis and Prophylactics**, in medicine, the taking of measures to prevent disease, and the means employed. For example, in smallpox, isolation of the patient is prophylaxis for those not yet infected; so is vaccination previous to infection. Quinine is a good prophylactic against malaria; but the best is the prevention of mosquito bites.

**Proportional Representation**, a system of election of representatives in legislative bodies which, without making it compulsory on the voter to name one candidate, permits him to insert a second name under the first, a third under the second, and so on, at his discretion. A vote is to be given to the candidate placed second on the paper if the first has had enough votes without it. If 658,000 people voted, and there were 658 members, 1,000 would be enough for each member; and if any candidate had more than 1,000, the excess beyond that number would be transferred to the successive candidates named in the voting-papers. The voting is general, not local. Every elector may vote for whom he pleases in any constituency. The method enables the elector to put his vote in writing, and makes it possible that the vote, although without effect in his own constituency, may in some other place aid in the election of the candidate for whom it is given. This system has been employed successfully in Switzerland. It has been proposed in several states of the United States, but it has failed of popular support.

**Prosecution.** See **Crime and Criminal Law.**

**Proselyte**, originally a person dwelling in a strange land; in the New Testament applied to a convert to the Jewish religion. The word is now applied generally to converts from one religion to another.

**Proskurov**, or properly **Ploskurov**, tn. in the Ukraine, Russia, with oil, brick kilns, potteries, copper foundries, candle manufactory. It contains in its cathedral a famous 'Virgin,' venerated by Roman Catholics and Orthodox alike; p. 27,000.

**Prosody.** See **Verse.**

**Prostate Gland**, in anatomy, a gland present only in the male, surrounding the neck of the urinary bladder and the commencement of the urethra.

**Prostitution.** In law a prostitute is a woman who has common and indiscriminate sexual intercourse with men for gain. The subject of prostitution is regulated by statute in most states. Various means of attempting to suppress or control it have been adopted. Some states have followed the European idea of inspection and license of houses of prostitution, while others have attempted to suppress them entirely, always without success.

**Protagoras**, Greek sophist of the 5th century B.C. His chief doctrine in metaphysics was a sheer sensationalism, which is shown by his recorded saying, 'Man is the measure of all things.' He is the leading figure in Plato's dialogue called by his name.

**Protection** in economics stands in opposition to free trade. Its purpose is, by duties on imports, to shelter home producers from foreign competition. It is based on the belief that the industries of a country need the support of the state in their struggles with foreign competitors either by duties on imports or by bounties on home produce. The modern theory of protection, in its more intelligent form, finds its defence in proposals urging restrictions upon imports for only a limited time; or it is supported upon military and political considerations which overbalance the economic ones. Different arguments for protection have been employed at different times in the industrial development of a country.

1. A protective policy would tend to increase the productive power of a nation by stimulating producers to take up more rapidly than would be otherwise possible those industries which would be most productive.

2. A stronger argument than the foregoing is that protection promotes diversity of em-

ployments: manufacturing centers furnish desirable home markets for agriculture, add to the value of land, and stimulate intellectual activity. 3. Under a high protective tariff, it is claimed that if foreigners wish to enter the American market they can do so by transferring their capital and skill to this country. 4. Although protective duties may increase the cost of living for a time, it is urged that they eventually bring about lower prices, through increased competition within the country.

5. Protection operates to encourage infant industries. 6. An effective argument in the United States has been that the workingman is largely benefited by protection. The argument rests for its validity on the fact that the resources of the country, and the capital employed, are greater with protection than without. 7. Conversely, it is commonly believed that when once high wages are paid, they make protection necessary to their maintenance. 8. An argument for protection which has been exploited in Great Britain refers to the advantages of a protective tariff as a basis for commercial negotiations. A country which pursues a free-trade policy must always be at a disadvantage in negotiating with a protectionist country. See **FREE TRADE**; **TARIFF**. Consult Alexander Hamilton's *Report on Manufacturers* (1791), an able statement of the arguments for protection; and Taussig's *Some Aspects of the Tariff Question* (1915).

**Protector**, an English state title, first assumed by the Earl of Pembroke (1216), and afterward by Humphrey, Duke of Gloucester (1422); by Richard, Duke of Gloucester (1483); by the Duke of Somerset (1547); by Oliver Cromwell (1653); and by his son, Richard (1659).

**Protectorate**, country which, as regards its foreign relations, is under the exclusive control of the sovereign of another power, so that its government cannot hold direct communication with any other foreign power. Thus since 1820 Liberia has been virtually a protectorate of the United States. The Republic of Panama may also be regarded as a virtual protectorate of the United States.

**Protein**, the name applied to a group of highly complicated carbon compounds, produced by animal and vegetable organisms, and essential to their life. It is the chief constituent of meat and of eggs, and is composed of the elements carbon, hydrogen, oxygen, nitrogen, sulphur, and phosphorus. In the body it is employed for building new tissue



and as a source of energy. Proteins are insoluble in and usually coagulated by alcohol. They are also coagulated by heat.

**Proterosaur**, a fossil reptile found in the Permian strata of Bohemia and North America.

**Proterozoic Era**, that period of geological time between the making of the igneous complex of the oldest known rocks and the beginning of the lowest system now known to contain well-preserved fossils. It is therefore the time between the Archean in its restricted sense and the Paleozoic. As thus used, it is a synonym of the term Algonkian of the U. S. Geological Survey.

**Protestant**. See **Protestantism**.

**Protestant Episcopal Church**, the title officially adopted by the Anglican communion in America (see CHURCH, ANGLICAN). The church of the Jamestown colonists in 1607 was the Anglican. With the recognition of the independence of the Colonies, at the close of the Revolution, the English Church as such ceased to exist there, but loyal Churchmen set themselves the task of organizing a national church upon Episcopal foundations and traditions. In the year 1784 a movement was begun to unite the Episcopalians in the United States in one organization. The English Prayer Book was to be the basis of the Liturgy, but so modified as to be suitable for the new political status.

The first General Convention, composed of 16 clergymen and 24 laymen from seven States, met in Philadelphia, Sept. 27, 1785, drafted an ecclesiastical constitution, and began the preparation of a liturgy. Correspondence with the Archbishop of Canterbury and the passage of the Act of Parliament enabling the English episcopate to consecrate bishops for America, prepared the way for the consecration in 1787, of Dr. White of Pennsylvania and Dr. Provost of New York. The General Convention which met in Philadelphia, July 28-Oct. 16, 1789, completed the union of the church in the States under one name and government.

The ministry of the church comprises bishops, priests, and deacons. The territory of the United States is divided into dioceses or missionary districts, each under the jurisdiction of a bishop. Bishop-coadjutors are allowed the right of succession, and also suffragan bishops who are eligible but have not the right of succession. The dioceses and missionary districts are further grouped into eight provinces, with a metropolitan see at the head of each. In matters of legislation

the General Convention is first, then the diocesan convention, and lastly the parochial vestry. The General Convention meets every three years. Any revision of the constitution of the Prayer Book must lie over from one convention to another and be passed by both. The diocesan conventions meet annually and legislate for their own internal affairs. Vestries are elected by the members of the parish. Rectors are chosen by the vestries, usually with the advice of the bishop. In matters of discipline there are canonical provisions, both general and diocesan.

There are various organizations devoted to the religious, social, and educational work of the church. The leading church publications are: *The Church at Work*, *The Churchman*, *The Living Church*, *The Spirit of Missions*, *The Witness*, *The Chronicle* and *The Anglican Theological Review*. Consult Bishop Perry's *History*; Hodges' *Three Hundred Years of the Episcopal Church in America*.

**Protestantism**. The name 'Protestant' was first given to the supporters of Luther, who 'protested' against the decree of the second Diet of Spire, in 1529. The name was soon extended to all the churches which separated from Rome, whether Episcopal or Presbyterian. Since the Oxford movement in the Church of England it has sunk into disfavor with the Anglican Catholic party.

**Proteus** (*Proteus anguinus*), a long, slender amphibian, representative of the family Proteidae, which retains throughout life external gills, which are provisional larval structures in most Amphibia. It lives always in absolute darkness. So far as is known, it never leaves the water. The body is white, faintly touched with red by the blood. The animal reaches a length of about a foot, has a long tail, four weak limbs placed far apart. A related species is found in the United States, in caves in Texas. The American mud-puppy or mud-eel, another related form, is nocturnal in its activities, searching at night for the worms, crayfish, frogs, etc., on which it lives and hiding under rocks, or amid weeds, during the day.

**Proteus**, in ancient Greek mythology, 'the old man of the sea.' He had prophetic powers; but any man who desired his advice must seize him and hold him while he changed into one shape after another: if he was kept a prisoner, at last he returned to his true form and declared the future.

**Prothallus**, the name given to the flat, heart-shaped body which results from the development of a spore of a fern. On the under

surface of the prothallus also appear in due course the sexual reproductive organs—the antheridia (male) and archegonia (female).

**Protococcus**, a genus of single-celled Algae often forming a yellowish-green stratum on trees, damp walls, and shallow pools.

**Protocol**, originally the first leaf glued on to a manuscript to show under whose direction and by whom the work was written. Later the word was used to denote documents drawn up by notaries. In diplomacy, a protocol is the preliminary draft intended to serve as a basis for a subsequent treaty, or the minutes of a congress or conference recording an agreement to attain certain ends by peaceful means. In industry the term protocol is sometimes used of agreements between employers and employees for the peaceful adjustment of labor problems.

**Protogine**, a modified form of granite which has taken on the characters of gneiss in the course of metamorphism accompanying mountain making. The term is used especially of the rock composing the central axis of the Swiss Alps.

**Protophyta**, a collective name given in some classifications to the simplest single-celled plants. With the Protozoa, animals of equally simple structure, they make up the Protista of Haeckel.

**Protoplasm**, the physical basis of life, most familiar as the jelly-like substance in certain cells. In its simplest known state, cytoplasm, it appears to be a homogeneous, transparent, semi-fluid substance; but high magnification and the use of suitable staining materials reveal a complicated structure. This appears to differ in different cells and at different times, but in general it is fibrillar—interspersed with minute filaments of denser material; reticular—with a mesh-work of delicate threads; granular—with exceedingly minute particles scattered in the substance; or alveolar—with a foam-like structure of liquid containing vacuoles round which the protoplasm streams. Protoplasm is continually undergoing chemical change, in the course of which complex substances are built up from simple ones, and are then in their turn broken up, the whole series of changes constituting what is known as metabolism.

**Protozoa**, or primitive animals, are typically unicellular organisms, in which the whole organism takes part in the reproductive process. Not a few Protozoa consist of a colony of cells, but generally in such colonies the units are more or less physiologically complete, each being usually capable of car-

rying on all the animal functions, including that of reproduction. The Protozoa are thus contrasted with the Metazoa, in which the organism consists of many cells, arranged in at least two layers, which have different physiological functions. Protozoa may be divided into three classes: The Rhizopoda, including forms generally resembling Amœba, whose locomotor organs are pseudopodia; the Infusoria, or forms which progress by actively moving threads, either of the type of flagellæ, as in the Flagellata, or of cilia, as in the Ciliata; the Sporozoa, which in the adult stage have no definite locomotor processes, are parasitic in habit, and reproduce by means of spores.

**Protractor**, a drawing instrument for laying off angles. It is usually in the form of a circle, semicircle, or quadrant, graduated along the margin into degrees, the central point being indicated by a mark or hole. Protractors may also be constructed on ordinary straight divided scales if these are broad enough.

**Proud, Robert** (1728-1813), American historian, born in Yorkshire, England. He emigrated to Pennsylvania in 1759, and taught in Philadelphia until the outbreak of the Revolution. His *History of Pennsylvania* (2 vols., Phila., 1797-8) is still valuable for the period it covers, from 1681 to 1742.

**Proud Flesh**, the popular term for exuberant granulations of ulcers or wounds. The new formed cells, which should lie at the level of the skin about the ulcer, and be of a bright-red color, in proud flesh rise above the common level, and are more or less pale and watery in appearance. They are, in fact, redundant and weakly. The proud flesh should be treated with dry dressings, and, if necessary, rubbed freely with sulphate of copper (blue stone) or sulphate of zinc.

**Proudhon, Joseph** (1809-65), French socialist, born at Besançon. He first became famous by his tract (1840), *What is Property?* He was a dreaded critic of the dominant bourgeois party, and spent a considerable time in prison. He framed no system and established no doctrine; but he regarded the constant appeal to the state for assistance as the bane of French political and social life. His few followers called themselves mutualists, and their idea is that society ought to rest on a basis of equality and of reciprocity of service rendered.

**Proust, Joseph Louis** (1755-1826), French chemist, was born at Angers. His work was characterized by its great exactitude, and

led him to establish the principle, that chemical compounds are of fixed proportions however prepared, known as Proust's Law.

**Proust, Marcel** (1871-1922), French novelist, was born and lived all his life in Paris. After 1902 an invalid, he gave up miscellaneous literary work and devoted himself to a long novel which was to recapture his memories of his whole experience. This novel *À la recherche du temps perdu* (1913-1926) ran to 15 vols. in French, 7 in the English translation by C. K. Scott Moncrieff (1922-1932). Proust is the most distinguished French writer of the present century, and his novel, called *Remembrance of Things Past* in English, is one of the great novels of the world.

**Prout, Samuel** (1783-1852), English painter in water-color, born at Plymouth. His *East Indiaman Ashore* (1819) shows a remarkable talent for marine painting; but he became famous as the painter of cathedrals, cities, and market-places.

**Provençal Language and Literature.** Provençal, the general term for the tongue of southern France, is one of the Romance languages, and none of the sister tongues possesses a literary monument so ancient as the Boëthius fragment (10th century). Phonetically (and geographically), Provençal stands midway between Italian and Spanish on the one hand and French on the other. Through political events northern French became the official language of the s. from the 15th century. But in Béarn the southern dialect was preserved till the 17th century. Literary production of some kind has never ceased; but the works belong properly to dialect literature, and are composed in the speech of Provence (proper), Languedoc, or Gascony. Mediæval Provençal literature may be divided into four classes.

1. *Lyrical Poetry.*—There seems to be no doubt that the courtly lyrics of the troubadours had their origin in popular poetry. The facts known to us are not sufficient to account for the finished state of Provençal literature in the poems of the earliest troubadour, William ix., Count of Poitiers (d. 1127), which are licentious but full of spirit. The poems by Bernart de Ventadour probably appeal to modern taste more than those of any other troubadour: they are elegant, tender, simple, and truly inspired. Bertran de Born's historical importance has probably been exaggerated (partly owing to Dante); but his warlike ditties, love poems, and *planchs* secure him a place among the best

mediæval poets. Guiraut Riquier (d. 1294), who often successfully reproduces the freshness of earlier days, is one of the last of the great poets. The foundation of a poetical academy at Toulouse (1323), and the composition, by its chancellor, of a *Poetics* of troubadour poetry (the *Leys d'Amors*), bear eloquent testimony that the literature was really dead.

But after the middle ages the influence of the troubadours spread, through Petrarch, over the whole of Europe. The troubadours never addressed unmarried women. The objects of their adulation were mostly great ladies, the wives of their patrons. The mistress was the feudal lord, the poet her vassal. With such a code, which was zealously fostered by the ladies themselves at courts like that of Eleanor of Poitiers, much of the poetry was necessarily conventional and much of the love feigned. Still, we have evidence that cases of true affection and of true inspiration were by no means rare, and that at times the relations between poet and beloved were anything but platonic. The love poem was called the *canço*, and rhymed in the most complicated fashion; indeed, this question of rhyme played a great part in all the genres. The *servente* was devoted to the main to non-amorous poetry (mostly political), and the *tenso* to disputes (real or pretended) between two or more poets. If we except the crusading songs, which are perhaps rather *serventes*, we have only a few religious lyrics.

2. *Epic and Narrative Poetry.*—It used to be held that there once existed a large body of Provençal epic poetry, now lost; but more recent research has proved that the few poems of the kind extant are derived from northern French originals. Of Provençal origin are the *novas*, which have considerable literary merit, and are important as showing the manners of the time. The longest and most valuable is the *Flamenca*, a mine for the historian of literature and civilization.

3. *Didactic Literature.*—Including religious and secular. There is no complete prose translation of the Bible, but several of the books have been rendered separately, often with skill and charm. First in bulk of the secular didactic are the vast encyclopædies. Many scientific subjects were treated separately. Among histories we have a highly important *Chanson de la Croisade*. A number of *ensenhamens*, written for the instruction of troubadours, *jolars* (jongleurs), serving men and women, and other classes of society, are as

bright and interesting as they are instructive. The works in this section are mostly in verse.

4. *Dramatic Literature*.—We have fragments of dramatic pieces dealing with religious themes. From the 15th century there are complete sets of mystery plays, but they possess no literary value. Secular plays (farces or moralities) are mentioned from the 15th century onwards, but all trace of them is lost. See the history of Provençal literature (medieval and modern) by Oelsmer. Downer's *Mistral* (1903) contains a sketch of the movement, a good bibliography, and an account of the language.

**Provence**, old prov., s.e. corner of France; its capital was Aix. First the habitat of wild Iberian and Ligurian tribes. In 1100 it passed to the counts of Barcelona, who made Provence the cradle of poetry and romance and the paradise of troubadours. In 1245, on the death of the last count, it was transferred to his daughter's husband, Charles of Anjou; it only became French in 1481, under Louis xi. Thanks to its dry climate, Provence has preserved its Roman remains in a fashion rivalled only by Italy herself.

**Proverb**. The best definition of a proverb is perhaps that given by Cervantes—*viz.* 'short sentences founded on long experience.' Every true proverb is pithily expressed, and is based upon the experience of mankind; but it must also meet with popular acceptance and be of widespread application. The great bulk of the better-known proverbs cannot be claimed as the property of any one nation; they are found in the mouths of all races. Differences in expression there may be, but the root idea remains the same. Thus, take our common saying, 'God helps those who help themselves.' The Greeks said, 'Pray not to God with hands folded.' The Spaniard words it, 'God helps the early riser'; and the natives of the Basque provinces have found perhaps the neatest expression of all—'God is a good worker, but He likes to be helped.'

Aristotle made a collection of proverbs, and so also did Plato. Shakespeare uses them as titles to his plays, and the same custom prevailed among the Spanish dramatists. But in no literature, as among no people, does the proverb play so important a part as in that of Spain. Strange to say, the Celtic races, with whom we associate quickness of perception and nimbleness of wit, are notably lacking in proverbs, whereas the intellectually less agile Teuton is particularly rich in them.

**Proverbs, Book of**, in the Old Testament, a collection of Hebrew didactic poetry, of

varied character and date, which was brought together not later than 250 B.C.

**Providence**, capital and chief city of Rhode Island. co. seat of Providence co., and the second city in New England, is situated on both banks of the Providence River, a narrow navigable arm of Narragansett Bay. 35 m. from the Atlantic Ocean and 44 m. s.w. of Boston. The business district of Providence occupies the central part of the city and has many handsome substantial buildings. Roger Williams Park (103 acres), at the s. end of the city, has a zoological garden, a fine bronze statue of Roger Williams, lakes, playgrounds, and boulevards. Among the many buildings are several libraries: the Public Library; the Athenæum, one of the first public libraries in America; the John Carter Brown Library, containing a collection of books and manuscripts on American history; the State Law Library, and the libraries of the Historical Society, the Medical Society, and the Y. M. C. A.

The oldest church building, the First Baptist, was built in 1775. A charter for a college was granted in 1764, and the first building of Brown University (originally the College of Rhode Island), one of the leading educational institutions in New England, was erected in 1770. Among other educational institutions are a Friends' School for boys and girls (1818), the State Normal School, Academy of the Sacred Heart, Lasalle Academy, St. Francis Xavier Academy, the Rhode Island School of Design, and the Franklin Lyceum.

Providence is the leading city in the United States in the manufacture of jewelry and silverware and has one of the largest mechanical tool factories in the world. There are also important printing and publishing industries, and manufactures of lumber, textiles, knit goods, brassware, copper smithing and sheet-iron products, carriages and wagons, electrical apparatus and supplies, enamelled goods, mineral and soda waters, soap and paints. The population of Providence is 253,504.

In 1636 the General Court at Salem, Mass., exiled Roger Williams because of his religious opinions, and in the same year he fled from the colony, bought land w. of Narragansett Bay from the Indians, and founded a town, which he then called Providence, in recognition of divine guidance. In 1638 the first Baptist church in America was organized here, with Williams as its pastor. Complete separation of temporal and religious affairs, with

entire religious freedom, were made the basis of the new settlement, for which, with Portsmouth and Newport, Williams obtained (1644) a royal charter as the 'Providence Plantations in the Narragansett Bay in New England.'

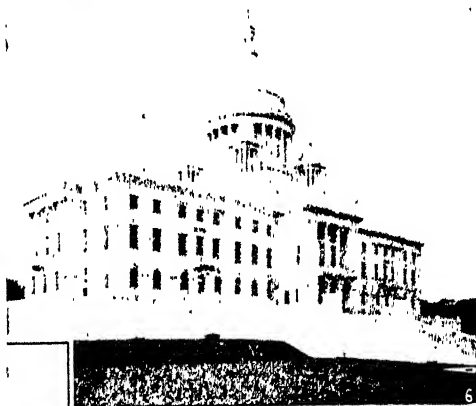
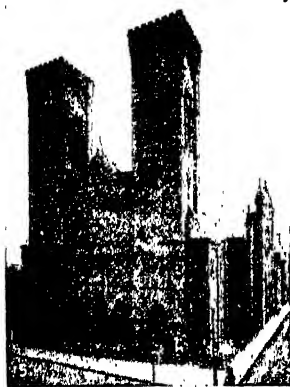
**Province**, originally, in ancient Rome, the department of public business assigned to a particular magistrate. When Rome acquired dominions outside Italy, they came to be called provinces in a more special sense; and thus the term finally came to mean a district, and not a department.

**Provincetown**, town, Barnstable co., Massachusetts, at the extremity of Cape Cod on the inland side, 120 m. by rail s.e. of

can Protestant-Episcopal prelate, of Huguenot ancestry, was born in New York City, the son of a wealthy merchant. In 1784 he became rector of Trinity church, New York, and two years afterward was elected first Bishop of New York.

**Provost** (Lat. *præpositus*), the chief magistrate of a burgh in Scotland, corresponding to the mayor in England. The term is applied also to the heads of certain colleges in England, and the University of Pennsylvania in the United States.

**Provost Marshal**, a military officer, common to all armies, who is detailed in charge of the police of a camp, garrison, or army in the field. In the United States service each



Providence, R. I.

Left, Cathedral; Right, State House.

Boston. It is a quaint old town with a fine harbor, has whaling and fishing interests, and is a popular summer resort. Provincetown was permanently settled in 1714; p. 3,668.

**Province Wellesley**, British colony on the w. coast of the Malay Peninsula, opposite Penang or Prince of Wales Island, to which it belongs administratively. It has been British since 1798.

**Provisors, Statute of**, a British statute passed in the reign of Edward III., prohibiting the making of a reversionary grant of a benefice, or receiving a fee or reward out of a living, as a provision for foreign cardinals.

**Provo**, city, Utah. Utah Lake, the Provo Cañon, and Bridal Veil Falls, in the vicinity, make it attractive to tourists. Provo is situated in a fruit-growing and cattle-raising region and exports large quantities of fruits and vegetables; p. 18,071.

**Provoost, Samuel** (1742-1815), Ameri-

can Protestant-Episcopal prelate, of Huguenot ancestry, was born in New York City, the son of a wealthy merchant. In 1784 he became rector of Trinity church, New York, and two years afterward was elected first Bishop of New York.

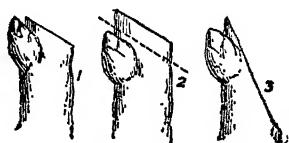
**Prox.** (proximo), 'in the next month.'

**Proxy**, a term applied to the authority granted to one person to vote in place of another, and also to the person who votes in exercise of that authority. To vote 'by proxy,' therefore, is to vote by representation. In the conventions of political parties voting by proxy is sometimes allowed, but never at elections.

**Prudden, Theophil Mitchell** (1849-1924), American pathologist, was born in Middlebury, Conn. He was connected with

the College of Physicians and Surgeons, Columbia University from 1879 to 1909. His works included *Hand-book of Pathological Anatomy and Histology* (with Francis Delafield, 6th ed., 1901).

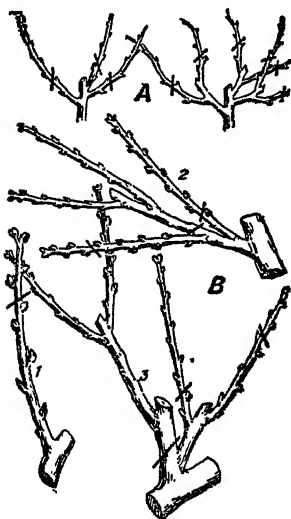
**Prunes.** The term prune may be applied to any plum which dries readily, without fermentation, but more particularly to those varieties which contain over 12 per cent. of sugar.



*Position of Cut*

1. Correct. 2. Too high; wood dies down to dotted line. 3. Angle too great; injures bud.

**Pruning**, the process of removing portions of the branches or roots of trees, shrubs, brambles, etc., for the purpose of rejuvenating the plant, making it more shapely, producing larger or better fruit or flowers, removing useless or injurious parts, facilitating



*Examples of Pruning*

A. Pruning a standard rose to form the head; first and second years' work. B. Pruning a peach tree; 1st, 2nd, and 3rd years' operations on same branch.

illage, spraying and harvesting, or of training the plant to some systematic form. Heavy pruning of the top of a tree or shrub tends to produce a strong increased growth of shoots and wood. The converse of this prin-

ciple is that heavy pruning of the roots tends to decrease the production of wood. One of the applications of this principle in orchard work is that when the trees are making a late summer growth of wood the roots may be slightly pruned by running a plough between the rows. This cutting of the roots tends to stop wood growth and to induce the formation of flower buds and fruitfulness.

The amount and time of pruning vary with the locality. If orchard trees are winter pruned in the dry Northwestern States they lose much moisture and become weakened. In the sunny Southwestern States, if the tops are thinned out to any great extent, the disease known as 'sunscald' is induced. In the more humid Eastern States, much pruning is often necessary for the development of fruit-buds on the inner branches of the tree and the production of high-colored fruit. Consult Bailey's *The Pruning Book*; U. S. Dept. of Agriculture *Farmers' Bulletin*, No. 181; Fernow's *The Care of Trees*.

**Prunus**, a genus of hardy trees and shrubs belonging to the order Rosaceæ. The fruit is a fleshy berry containing a one-seeded stone. The genus includes apricot, plum, cherry, almond, and peach.

**Prurigo and Pruritus**, in medicine, a cutaneous eruption, papular, and accompanied by severe itching, or pruritus. There may be no eruption if scratching be avoided. The process which causes itching (in such cases) is possibly chemical, possibly acid in nature, for alkaline solutions often relieve the itching. If severe and of long standing, as is often the case, it produces a highly nervous condition through want of rest.

**Prussia**, former kingdom of Germany, since 1918 a state of the German Reich, lying between Poland and Russia on the e., Holland on the w., the Baltic Sea and Denmark on the n., and Bohemia and Bavaria on the s.; area, 113,157 sq. m. Prussia is the chief mineral producing state of Germany, the principal minerals being coal, lignite, iron, salt, zinc, lead, and petroleum. Prussia is an agricultural country. The leading crops are wheat, rye, summer barley, oats, potatoes and hay. All hardy fruits are raised, vineyards yield large amounts of wine, and hops are extensively planted. Cattle breeding and horse raising are important and the forests yield valuable timber.

The textile industries comprise the most important manufacturing interests. Others include dyeing, paper-making, glass and porcelain, cement, chemicals, leather goods and

tanning, sawmilling and distilling, sugar manufacture, iron and steel works. Education is free and compulsory for children between six and fourteen. On November 13, 1918, Prussia was proclaimed a republic. Besides the Diet there was a State Council (Staatsrat) elected by the Provincial Assemblies, whose function was to advise and control the Diet. The Diet elected a premier. Prussia so functioned as a State of Federal Germany until the abrogation of States' rights by Hitler's totalitarian regime, 1933.

The population of Prussia is 41,762,000. The principal cities are Berlin, 4,332,000; Cologne, 769,000; Essen, 660,000; Breslau, 615,000; Frankfurt, 547,000; The early history of the kingdom of Prussia is closely connected with that of the *mark* of Brandenburg, received as a fief in 1134 by Albert the Bear (a Saxon); the duchy of Prussia, united to Brandenburg in 1618; and the house of Hohenzollern, the reign of Frederick-William (1640-88) of this family being so effective as to raise Prussia to the rank of a leading European nation. Since 1871, when King William of Prussia was proclaimed German Emperor, Prussia has been a part of Germany. Under the Peace Treaty of Versailles in 1918, Prussia lost the province of Posen, most of West Prussia, and parts of East Prussia, Silesia, Schleswig-Holstein, and the Rhine province, with nearly 4,600,000 inhabitants. Nazi Germany seized and annexed these territories in 1939. See GERMANY; PRUSSIA, EAST; PRUSSIA, WEST.

**Prussia, East**, province, Prussia, in the extreme n.e.; belongs to the North German plain, and includes part of the Baltic ridge, with numerous lakes. It is primarily agricultural and is especially famous for the breeding of horses. Other industries include iron works, shipbuilding, sugar factories, breweries, distilleries, sawmills, and paper and glass works. Amber is obtained on the coast n.w. of Königsberg, the capital. The original inhabitants, the Pruzzi (whence Prussians), were a Lithuanian tribe, who were subdued in the 13th century by the Teutonic Knights. From the beginning of the 15th century until 1660 the province was subject to Poland. In 1656 the duke—the Elector of Brandenburg—secured the independence of his duchy, and in 1701 proclaimed himself king of Prussia. Certain districts in East Prussia, subject to plebiscite by the Treaty of Versailles, have been retained by Prussia.

**Prussia, West**, province of former kingdom of Prussia, held mostly by Poland, 1919-

39. It lies in the basin of the lower Vistula, and in the n. touches the Baltic. It belongs to the North German plain, but is diversified by the Baltic ridge, and is essentially an agricultural region. Much attention is given to the breeding of horses. Iron works, sawmills, breweries and distilleries, sugar factories, shipbuilding, and glass works represent the other principal industries. West Prussia remained in the power of Poland down to 1772, when it passed to Prussia. At the conclusion of the Great War, the greater part was allotted to Poland. It was seized by Germany, 1939, one of the first steps in the European War, 1939.

**Prussian Blue**, a dark blue solid of copery lustre, and possessing a variable composition depending upon the method of its preparation. Prussian blue is insoluble in water and stable to dilute acids, but is decomposed by alkalis; and though formerly much used for laundry purposes, paper-staining, and the preparation of blue ink, it has been largely superseded by aniline products. Its present largest use is in the manufacture of paints and printing inks.

**Prynne, William** (1600-69), Puritan pamphleteer, was born in Swanswick, Somerset. He became involved in ecclesiastical controversy as the champion of the Puritan party. He was fined, expelled from the bar, sentenced to the loss of both ears and imprisonment for life; was released, fined again and branded on the face. He was elected M.P. for Newport, Cornwall (1648); but was again imprisoned for three years by Cromwell. After the Restoration he was appointed keeper of the records in the Tower. His only works of any value are *A Brief Register of . . . Parliamentary Writs* (c. 1662) and *An Exact Abridgement of the Records in the Tower of London* (1656-7).

**Przemysl**, city, Poland, seized by Russia 1939; is a Roman Catholic bishopric (since 1375) and Greek bishopric (1218), and has two cathedrals. It has a good trade in wood, leather, corn, and linen; p. 47,948.

**P.S.** (*postscriptum*), postscript.

**Psalms, Book of**, one of the books of the Old Testament, the first of the third division or *Kethubhim* of the Hebrew Bible, and the second in the Septuagint and other versions. The English version contains 150 lyrics, as do the Hebrew and the Septuagint. Probably the most important questions regarding the psalms are those of authorship. Though the collection is called the 'Psalms of David,' it has never been maintained that David wrote

them all. The titles giving the writers' names are certainly ancient, but in most cases considerably later than the compositions to which they are prefixed. Another interesting question is whether any particular writer in the psalms speaks for himself or in the name of the 'church-nation.' It is plain that while the 'church-consciousness' is present in some psalms, it is going too far to assert that it dominates in all; and while some, perhaps most, are transcripts from personal experience, yet the usual interpretations of the past went to extremes of individualism. Consult Davison's *Praises of Israel*, King's *Psalms in Three Collections*, Brigg's *Commentary*.

**Psaltery**, a musical instrument used by the ancient Hebrews, with whom it was a favorite. It was shaped somewhat like a harp and was played by plucking the strings with or without a plectrum. Later a keyboard mechanism was attached to it and it thus became the parent of the spinet, harpsichord and eventually the piano.

**Pseudomorph**, a mineral that occurs in the form which is characteristic of another mineral. In the clayey sandstones accompanying the salt measures of Cheshire the surfaces of the beds are often covered with small perfect cubes of sand. These are pseudomorphs after crystals of salt, and show that the bed of sediment was laid down in saline lakes which were subject to desiccation.

**Pseudonyms**, fictitious names adopted by writers to conceal their identity. They take the form either of a signature wholly different (pseudonym), transposing the letters, or portions of their real name (anagram), a special phrase having direct reference to the subject-matter treated (phraseonym), aspiring to a title or a supposed aristocratic name (titlenym or aristonym), or simply employing one or more initials of the author (initialism).

**Psidium**, a genus of tropical shrubs and trees belonging to the order Myrtaceæ. The fruit, a globose or ovoid berry, known as 'guava,' is a favorite for preserves, jellies, and the like. That of *P. Guajava* and *pyriferum* is yellow and aromatic, is pleasantly acid, and is made into the exported 'guava-jelly.' The 'strawberry-guava' has a small spherical fruit; acidulous, strawberry-like in taste and fragrance. It is deep red in color, fading to white in the center of the pulp. Both species are cultivated in Southern California, and are common in the West Indies and tropical America.

**Psittaci**. See **Parrot**.

**Pskov**, government. Northwest Russia; lying s. of the government of Leningrad. The northern part is a low-lying plain; the southern part rolling plateau country, often rising into hills. The climate is severe but variable. Forests cover a third of the area, and yield pitch and tar. Cereals and flax are raised for export, and hunting and fishing are important. Manufacturing industries consist chiefly of distilleries, tanneries, brick works, flour mills, and flax works.

**Pskov, Pleskov, or Pleskau, tn.**, Northwest Russia, capital of the government of the same name; 171 m. by rail s.w. of Leningrad. The city is the seat of an archbishop and has a cathedral of Russo-Byzantine style (1689-98), and other interesting old churches. Tanneries, distilleries, sawmills, flour mills, manufactories of tobacco, cordage, flax materials, and sailcloth represent the chief industries; p. about 44,000.

**Psoralea**, a genus of shrubby and herbaceous plants belonging to the order Leguminosæ. *P. esculenta*, a native of the Western States, yields an edible tuberous root, known as *pomme de prairie*, the introduction of which into Europe was unsuccessfully attempted at the time of the potato rot. It was an important foodplant of the Indians and early settlers, who boiled it and found it palatable.

**Psoriasis**, a cutaneous disease characterized by slight elevations of the surface of the skin, covered with whitish scales. The eruption begins in small rounded spots, which may remain small, or may enlarge indefinitely, the center becoming more normal, while the inflamed margin continues to extend. Itching is often absent altogether, and very seldom severe. If left to itself, the disease generally tends to persist indefinitely. But in the great majority of cases it is very amenable to treatment, both local and constitutional.

**Psyche**, in Greek mythology, a maiden so beautiful that Venus herself was jealous of her and ordered Cupid to go and inspire her with love for the meanest of men; but instead he fell in love with her himself. He charged her never to inquire who he was; but she disregarded the injunction, and the god left her. In her abandonment Psyche wandered from place to place to seek him; until at least she was made immortal, and was united to Cupid for all eternity.

**Psychiatry**, that branch of medicine which relates to mental diseases, and studies their pathology, clinical conditions, cause, and treatment. Physicians who specialize in this



science are called psychiatrists or alienists.

**Psychical Research.** the systematic inquiry into such phenomena as alleged telepathy, apparitions, clairvoyance, premonitions, mediumistic phenomena, haunted houses, dowsing, and all residual mental phenomena. Traditionally these alleged phenomena have been associated with the belief in a spiritual world and generally made evidence of its existence. The London Society for Psychical Research was incorporated to investigate such phenomena in 1882 and has published volumes of *Proceedings* and a *Journal* representing the results of its work. An American Society was founded in 1885, but soon afterward was dissolved by union as a Branch of the English Society. This branch was later dissolved and a new society in 1906, to be independent of the parent body, was organized. It publishes a monthly *Journal* and *Proceedings* similar to those of the British Society.

**Psychoanalysis.** See **Psychotherapy.**

**Psychology.** Psychology is sometimes defined as the science of mind and sometimes as the science of behavior. These two definitions mark a fundamental divergence of opinion. The older scientific psychology concerns itself with the study of mind and defines mind as the sum total of immediate experience. More recent psychological trends have been toward behaviorism, which studies, not the immediate experience of an animal or human being, but its behavior or actions in response to certain stimuli. The greater body of scientific results has been obtained under the former point of view. The behavioristic attitude came much later and was first applied to the study of animals. Afterwards in mental tests and in diagnosis of mental disease this attitude was extended to the study of human beings. All scientific results require previous observation by highly trained observers. In the older psychology a trained observer observes and reports upon his own mental processes. In a behavioristic psychology a trained observer observes the behavior of others, notably of very young children who have not yet had opportunity to learn ways of action. In general the two methods yield disparate results and can not be compared. For the former consult works by Titchener and Boring; for the latter, works by John B. Watson.

Of the numerous topics in the older psychology *memory* is selected for discussion here. Memory can be explained by the law of association. This law may be stated: when-

ever a sensation or image comes into mind, there tend to come with it all the other sensations and images that have ever before been in mind with it. Naturally there are too many previous associates for them all to appear at any time; there must be some selection. The laws of memory state the principles under which the selection occurs. A thing can not take on meaning for us as idea or perception unless it is in some way familiar. The term memory is usually restricted to a successive revival of sensations and images by association, e.g., the bringing up of one idea out of another or out of a perception, and thus does not include the almost simultaneous association of the perceptual context and core.

The laws of memory have been worked out by experiments in the psychological laboratory. A subject is required to learn some material—prose, poetry, or a series of nonsense syllables like *ham-tup-lor-kiz-wex*. Learning is very greatly aided by a mental grouping of the material into parts. Nonsense syllables are most easily learned when repeated in rhythm, and poetry is easier to learn than prose. Meaningful material is much more easily mastered than nonsense, and the more meaningful the material the easier it is to learn it. It is always easier to learn understandingly than blindly.

It is best to go over material slowly if permanent acquisition is desired. A doctor's knowledge that must needs be always available should be acquired as slowly as is compatible with good attention, if the learning is to be efficient. The speaker, however, who prepares for a particular address should go over his notes rapidly well in advance and also just before the time of the speech. He thus learns more economically for the given occasion, but forgets faster afterwards than he would have done with slow learning. Economy of learning is also secured by a wide temporal distribution of the repetitions for learning. More is learned by two repetitions of a given material on each of six days than by six repetitions on each of two days; and, within practical limits, the longer the time through which the effort is distributed the greater the result.

In a long material economy is served by repeating the whole material as a unit rather than by learning it one part at a time. Opposed to this rule is the fact that long materials are intrinsically difficult; doubling the length of a task more than doubles the effort required for its learning. The gain, however,

that comes in learning separately the parts of a long poem or speech is more than offset by the final difficulty of so welding the separately learned parts together as to give the material as a whole the familiarity of the several parts. Forgetting takes place rapidly at first and then more and more slowly until finally the change is so slow as to be discernible only over long periods of time. In one typical experiment over half the material was forgotten in the first twenty minutes and one-fifth of it was remembered after a month. Things that can not be recalled at all can not, nevertheless, be said to be entirely forgotten, for they can be relearned with a saving over the initial effort. In this sense a thing once thoroughly learned may be said never to be entirely forgotten, for the span of life is probably too short for the effort of the learning to become inappreciable. The childhood memories of the aged, of drowning people, and those that occur in dreams, attest this fact.

*Behavior Psychology.*—Opposed to the definition of psychology as the science of immediate experience is the view that psychology is the science of behavior. Behaviorism as a recognized field of scientific endeavor is an outgrowth of animal psychology, and it has achieved a following only since 1910. Behaviorists, from the first, were interested in the behavior per se—the animal's responses to stimulation and its adjustment to situations within its environments. Thus, without refuting the earlier points of view, behaviorism, an experimental or observational biology, has supplanted them. The scientific accord effected thereby has been offset, however, by a disagreement in terminology. In addition to animal psychology, behaviorism was strengthened from two other directions: from psychopathology and from applied psychology.

*Animal Psychology.*—Most of the investigations of animal behavior have dealt either with the capacity for sensory discrimination of different animals or with their ability for learning. The former studies show the fundamental capabilities of an animal for responding to various aspects of its environment; the latter evaluate its capacity for modification of behavior over against new environmental situations. Learning is thus a measure of the intelligence of the animal.

Learning, a modification of behavior as the result of repetition of a situation, occurs at all levels of the animal scale. When a weak stimulus acts repeatedly on a simple animal,

the animal may learn to cease responding, or, when a strong stimulus acts again and again, it may learn to avoid it completely by a heightened reaction. At higher levels learning is said to be associative. In this form of learning a second stimulus, associated with the one that initially sets off the reaction, comes as a result of its repeated association to touch off, by itself, the reaction. The saliva flows in the cat's mouth at the sound of the dinner bell, and the cat is said to be conditioned to the sound of bell; the earthworm, that has been repeatedly given electric shocks when it crawled on a piece of sandpaper, now draws back as soon as it feels the sandpaper. The numerous experimental studies in which animals learn to open puzzle boxes or to find their way through mazes are complicated forms of this kind of learning that are susceptible to quantitative measurement.

Instincts are inherited forms of behavior. All behavior must be either instinctive or learned. Among the lower animals learning plays but a small part and most behavior is instinctive. In the higher forms learning is increasingly important, but complicated instincts also exist. Generally the two kinds of behavior are intricately interwoven, as, for example, in the sexual behavior of man. The most complex forms of instinctive behavior, with the smallest admixture of learned behavior, are to be found in the insects, especially in ants and bees.

*Freudian Psychology.*—The Freudian psychology of human nature looks upon the behavior of an individual as the resultant of many interacting trends called 'wishes.' It recognizes that the conduct of a human being is not singly motivated, but that a person acts very frequently upon conflicting wishes. If I meet someone whom I intensely dislike I am beset by two opposing motives: I wish to tell this man my opinion of him, and I wish also to observe the polite conventions. The wish that is stronger at the time wins. If the wishes are nearly equal in strength, I may start politely and end in anger, or I may begin rudely and conclude with an apology. If one wish is much stronger than the other, it may suppress the other almost entirely. Nevertheless the suppressed wish generally has some effect on behavior. If I am polite, my tongue may stumble and spoil the suavity of my assurances. If I am angry, I may cloak my rudeness in the courteous phraseology of sarcasm. Wishes are biological trends of the organism for response and are

not necessarily conscious. The person who has them may be unaware of their nature and they are thus sometimes paradoxically referred to as 'unconscious ideas.'

Instincts are wishes in this sense, and the sexual and nutritive instincts in their various forms are important in determining conduct. The wish to conform to the social code of ethics is called the 'censor,' for the reason that it conflicts with and often represses unethical wishes, notably those based on the sexual instinct. The conflict between the censor and a repressed wish may lead to a dissociation of the personality, in which each of the conflicting tendencies is expressed in a portion of the personality. Such an individual is persistently inconsistent. The phenomena of hysteria, 'shell-shock,' and many nervous disorders are of this form. Repressed wishes are normally partially realized in the content of dreams; in the dream-state, as in reverie and hypnosis, the censor is weakened. The nature of repressed wishes can often be arrived at by the method of psycho-analysis, a method in which the behavior of the individual under shrewd but sympathetic questioning, his inadvertent admissions, the content of his dreams, and many other symptoms of conflict are pieced together by the expert clinician to give the information that the censor tends to repress.

*Mental Tests.*—The mental test is a simple procedure for a quick determination of the degree of some human capacity. In a mental test the subject is given under standard conditions a simple task to perform and the degree or quality of his performance is noted. It is often impossible to define any general capacity of which the test is diagnostic. Except as they bear on intelligence, the use of tests has not as yet contributed greatly to a knowledge of the fundamental human capacities. A very great variety of tests have been invented and used experimentally. There are tests of motor capacity (speed of tapping with pencil, accuracy of aiming with a pencil, steadiness of the hand), of sensory capacity (visual and auditory acuity, discrimination of brightnesses, colors, tones, and weights), of concentration (counting dots on a paper, crossing out all the a's on a page of pi, performing disparate activities simultaneously), of description and report (including the tests of fidelity of report which bear on the reliability of testimony), of learning (repeated tracing of a design by seeing the hand and pencil only in a mirror), of memory, of suggestibility, of imagination (seeing images in

ink-blot, supplying missing words in a text), of range of information, and of general intelligence.

Intelligence is the capacity of an individual adequately to adjust his behavior to new situations. It is a general ability, independent of the nature of the particular novel situation, and appears as a constant factor in a given adult individual. In childhood intelligence develops steadily from infancy to adolescence. In the early years the development of intelligence is the most marked mental change that occurs; in adulthood almost all development is an advance in specific abilities and knowledge which is limited only by a maximum of intelligence already achieved. Since nearly all mental tests require adjustments to novel situations, it follows that intelligence is conducive to success in mental tests, no matter what their specific nature, and that, conversely, any mental test may in part measure intelligence. Hence intelligence is ordinarily not measured by any single test, but by a combination of many tests. However, no combination of tests can more than partly measure the intelligence. Psychology has as yet attained to no more definite conception of intelligence. The sanction for the concept lies solely in the fact that it works for progress both in the practical use and in the scientific development of mental tests, and that there is as close agreement between the results of intelligence tests and individual estimates of intelligence as there is between the various individual estimates themselves.

The principal method for testing intelligence is that of the Binet scale, which has passed through several revisions and is now in wide practical use in the testing of children. The scale in its latest form consists of a graded series of ninety simple tests which are grouped in the series according to the age at which the developing intelligence of a normal child is adequate to them. The scale is administered by determining the level of difficulty at which the subject is unable to 'pass' the tests. A child who passes all the tests normal to six years of age and fails on half of those for the seventh year and all of those for the eighth year has the intelligence of the 'average' child of seven and a half years, or, in technical terms, a 'mental age' of seven and a half. The tests run from the third year on through the fourteenth year to groups of tests for 'average adults' and for 'superior adults.' The mental age of average adult is considerably less than sixteen years,

i.e., in the average person the development of intelligence has reached its maximum before the age of sixteen.

Feeble-mindedness is defective intelligence. Feeble-minded persons can therefore be classified with respect to their mental ages as follows: Idiot: Mental age three years or less. Imbecile: Mental age four to six years. Moron: Mental age seven to twelve years.

*Applied Psychology.*—Mental tests and psychological methods of investigation have been applied in various fields of practical work; notably in industry, in law, in social work, in medicine, and in education. In industry use has been made of intelligence tests and of special vocational and trade tests for the purpose of classifying and employing men. The United States Army has also used trade tests, in connection with its system for classification of personnel, for the assignment of new recruits to skilled work within the army. A great deal of work has been done by industrial concerns on tests for the selection of salesmen. The psychology of advertising has also received considerable attention. In the law and in social work considerable use has been made of intelligence tests for the determination of the responsibility of delinquents. Various mental tests of diagnostic value have been utilized in psychopathology, while tests of learning and of mental equipment have found their places in education. Since 1935 many eminent psychologists have turned their efforts toward the study of psychometrics, the application of statistics to psychology. With psychometrics, theory and fact are being knit more closely together. Topology was in 1936 one of the most recent phases of psychology. It is the theory which correlates characteristics of the individual with his external stimuli. Through statistical investigations or "factor analyses," important discoveries were made in 1936 in the field of individual psychology and political psychology.

In September, 1936, the American Psychological Association held its forty-fourth annual convention at Hanover, N. H. Such subjects as mental and emotional hygiene, vocational guidance, and health guidance entailing the application of psychology were found to be eclipsing the classical subjects in the public schools. It further revealed a growing need for more psychology teachers and psychology text books in the schools, and that psychology pupils have better relationships with their parents, the opposite sex, ideals and religion.

Psychiatric contributions were the reports of Drs. H. H. Jasper and H. L. Andrews, Brown University, who made use of the rhythmic electric impulses from the brain to locate defective areas in that organ. The hypnotic trance and how it differs psychologically from natural sleep was demonstrated by Drs. E. Newton Harvey of Princeton University, and A. L. Loomis and Garrett Hobart of Loomis Laboratories.

During World War II hundreds of psychologists were in full-time government employ engaged in work directly relevant to the war effort or to public welfare. Aubrey Lewis reported in 1942 that war stress has not appreciably increased mental disorders among British civilians; and J. C. Solomon, studying the reactions of children in San Francisco to their first blackout, found that the sudden darkening of homes produced excitement but little fear except when adults in charge of the children showed fear.

Consult Brown's *Psychology and The Social Order* (1936); Lewin's *Principles of Topological Psychology* (1936); Guilford's *Psychometric Methods* (1936). See also BEHAVIORISM; GESTALT PSYCHOLOGY; INTELLIGENCE; MENTAL DEFICIENCY.

Consult general texts as Warren and Carmichael's *Elements of Human Psychology* (1930); Watson's *Behaviorism* (1930); Murphy's *Historical Introduction to Modern Psychology* (1932); Boring's *History of Experimental Psychology* (1939); Cannon's *Bodily Changes in Pain, Hunger, Fear and Rage* (1929); Adler's *Practice and Theory of Individual Psychology* (1929); Freud's *Psychopathology of Everyday Life* (1914); Terman's *Measurement of Intelligence* (1916); Murchison (ed.) *Hand-Book of Child Psychology* (1931); Allport's *Social Psychology* (1924); Hollingworth's *Vocational Psychology and Character Analysis* (1930); Tiffin's *Industrial Psychology* (1942).

**Psychophysics** is that branch of psychology which studies the relation of mental to bodily processes. It is distinguished from pure psychology by the fact that it has bodily processes in view as well as mental, and from physiology by the fact that its primary interest is in the psychical processes rather than in their bodily conditions. Psychophysics must also be distinguished from what is known as experimental psychology; for although it necessarily uses experimental methods, it may avail itself also of evidence in regard to the connection of mental and bodily states which is not experimental. As a

definite branch of psychological inquiry psychophysics was founded by Fechner in 1860. Weber had already employed what is known as the Method of Least Differences. To this method Fechner added two others of a less direct character, the Method of Right and Wrong Cases and the Method of Average Error. For a brief account of the Weber-Fechner investigations see James's *Psychology*, vol. i, p. 533 ff.; and for fuller details as to methods and results, Külpe's *Psychology* (Eng. trans. 1893).

**Psychotherapy** has come into wide use as the general name for the various forms of mental healing which have lately sprung into prominence both within and without the medical profession. It is used to cover such varied and opposing activities as the Emmanuel Movement, Christian Science, Faith Cure, etc. Definition is therefore important and difficult. Dr. Richard C. Cabot, of the Harvard Medical School, defines psychotherapy as the 'attempt to help the sick through mental, moral and spiritual methods.' It has been frequently said that psychotherapy is as old as the beginnings of medicine, but it was not until the work of Bernheim and Liébault a half a century ago that a thoroughly scientific basis was given for psychotherapy properly so called. They laid the foundation for a system of therapeutics based on suggestion.

Psychotherapy may be said to have its basis in the quality of the human mind common to all—suggestibility. It follows that the central method of psychotherapy is suggestion. Perhaps it would be more correct to sum up the methods under six heads: Hypnotism, Suggestion, Auto-Suggestion, Persuasion, Re-education, and Psycho-analysis.

From the prominence given to hypnotism in the treatment there arose a measure of confusion. But, as Dr. Hinckle points out, 'hypnosis of itself, without suggestion, never accomplished anything; the forceful directions given the patient during the responsive state of hypnosis achieve the results.' (See **HYPNOTISM**.)

Psycho-analysis depends upon the theory that 'many nervous and mental diseases arise from suppressed emotions' which for one reason or another do not run their complete course. The psycho-analytic method aims at removing the repressive influence, bringing these forgotten ideas and emotions back to consciousness and giving them full expression.

The results already gained by psychotherapy have been notable, though it is as yet

imperfectly developed. See Dubois's *Psychic Treatment of Nervous Disorders* (1903); King's *Rational Living* (1907); James's *Psychology* (1891); Hoffding's *Outlines of Psychology* (trans. 1902); Worcester, McComb and Coviatt's *Religion and Medicine* (1908); Jastrow's *Fact and Fable in Psychology*; Allen's *Psychotherapy with Children* (1942).

**Psychotherapy, Progress in.** Development in psychotherapy since 1935 has seen this science engaged in gaining more detailed knowledge of the relationship of psychic factors or mental instabilities, which find common ground in such maladies as heart disorders, arthritis, stomach disorders and such distressing conditions as shortness of breath, weakness in the back, chest pains, exhaustion, nausea, faintness, headaches, fatigue and speech impediment. Psychotherapy has made no attempt to treat organic disease but has been successful in conditions which are partially or totally the result of mental agitation. The principal means of treatment has been the establishment of clinics in most of the large cities of the world. The purpose of the clinics is to secure for the patient equanimity and to enable him to develop a normal personality. This process is called re-education. The therapist tries to substitute good mental habits for bad ones. The clinics offer "classes in thought control" and by group instruction they teach: first, relaxation; second, mental ease through imagery; third, tests to verify that the first and second are being applied; fourth, patients are asked to relate the experiences of their ailments; and fifth, the doctor delivers a lecture based on each patient's testimonial.

A 1935 tabulation showed almost half the hospital beds in the United States are occupied by mental cases. In the last fifty years the population of the United States has doubled while mentally ill cases have increased ninefold. There were 168 private mental hospitals in the United States in 1937, fifteen per cent of the total. Psychotherapy as practiced in hospitals today emphasizes kindness to patients and the stimulation of their intelligence. The better known therapeutic methods of the mental hospitals are: Occupational Therapy, which instructs the patients in various forms of work, such as weaving, carving, knitting or carpentering; hydrotherapy, which consists of dousing the patient with water to tone up his system, Physiotherapy, or exercising him in gymnasiums, through walks and playing games; and Practical Therapy, or giving the patient

normal treatment, encouraging him in normal mental and physical endeavors.

Dr. William A. White of St. Elizabeth's Hospital, Washington, believes that psychotherapy may yet enlighten the dark areas of medicine—namely, epilepsy and cancer.

The nervous breakdown, the American business man's disease, has been aided by psychotherapy. Research by Pavlov and Gantt have helped to prove the breakdown is a state in which emotional factors prevent one from carrying on normal living.

A survey was made in 1936 under the auspices of the Committee on Mental Hygiene and Psychiatric Nursing to determine the need for specialized psychotherapeutic nursing in American hospitals.

A new form of functional nervous disorder attacking only airplane pilots and called aeroneurosis was reported in 1937 and was being studied by the U. S. Medical Corps. In World War II the expression 'shell shock' of World War I was no longer heard, psychologists having affirmed the findings of 1914-18 that the types of neuroses and psychoses found in men in uniform do not essentially differ from those met in civilian life.

In 1936 insulin was used in Europe for the first time in treating the mental disease, schizophrenia, and a little later metrazol also was used. The use of electroshock, introduced in 1939, has practically replaced metrazol and is being frequently used with insulin. 'Shock' therapy continues to be used extensively.

**Ptah**, a deity in Egyptian mythology, the artificer of the universe, the creator of the cosmic egg, out of which came the sun, the moon, and the earth.

**Ptarmigan**, a grouse of the genus *Lagopus*, distinguished mainly by having the feet feathered to the toes, and by its northerly habitat, all the species living in the subarctic zone, or else upon high mountain tops.

**Pterichthys**, or **Winged Fish**, is one of the curious fossil fishes. It belongs to a group which is entirely extinct, and is characterized by the presence of an armor of tuberculated bony plates which covered the head and the anterior part of the body.

**Pteridospermeæ**, a class of Palæozoic plants, embracing those Palæozoic plants with the habits and much of the internal structure of ferns, which were propagated by seeds, not by spores.

**Pteris**, a genus of ferns which includes a large number of species widely distributed over the tropic and temperate regions of the world.

**Pterodactyls**, flying reptiles which inhabited the earth during the Mesozoic epoch. In size some were very small; others had a stretch of wings nearly equalling twenty ft. Their remains are found in the Jurassic and Cretaceous rocks both of Europe and N. America.

**Pteropoda**, a group of molluscs grouped as opistho-branch gasteropods, which have been profoundly modified in order to fit them for the pelagic life. They are found in the open water, and though the number of species is small, the number of individuals is incalculable.

**Pterospermum**, a genus of tropical Asiatic shrubs and trees belonging to the order Sterculiaceæ.

**Ptolemaic System**, the order of the universe as expounded by Ptolemy. It rested on the postulates that the earth is spherical, that it occupies a fixed central position, and that the sphere of the heavens revolves round it from e. to w., carrying all celestial objects with it, once in twenty-four hours.

**Ptolemy**, more fully **Claudius Ptolemæus**, astronomer; observed at Alexandria from 127 to 151 A.D. He embodied Greek astronomy in his *Almagest*, and his system of geography, containing a description and maps of the known world, preserved unquestioned authority down to the 15th century. A geometer of the first order, he effectively founded trigonometry, discovered evection, and perfected the epicyclic theory of planetary movement. See **PTOLEMAIC SYSTEM**.

**Ptolemy**, in Greek Ptolemæus, the name of a dynasty of kings of Egypt, the founder of which was one of Alexander's generals. Ptolemy I., surnamed Soter, or 'the Saviour,' reigned from 323 to 285 B.C. In the division of the provinces after Alexander's death he managed to secure for himself Egypt. In 285 Ptolemy abdicated in favor of his youngest son, Ptolemy Philadelphus; he lived for two more years. His name is memorable as that of the founder—though some ascribe the foundation to his son—of the museum and library of Alexandria and the friend of Euclid and other learned men.

Ptolemy II. (Philadelphus), son of the above, who reigned from 285 to 247 B.C., is famous chiefly for his internal administration and his patronage of learning; under him the museum of Alexandria became the center of literature and science. The Greek translation of the Old Testament, known as the Septuagint, is said to have been made by his order.

Ptolemy III. (Euergetes), son of the above, who reigned from 247 to 222 B.C. Soon after his accession he invaded the Syrian kingdom, advancing as far as Babylon and Susa, conquering Mesopotamia, Babylonia, and Susiana, and receiving the submission of all the countries of Asia up to the Bactrian and Indian frontiers. But Seleucus soon recovered all these provinces, except Syria itself.

Ptolemy IV. (Philopator), eldest son of the above, reigned from 222 to 205 B.C. At the beginning of his reign he murdered his mother, brother, and uncle and in 217 he defeated Antiochus the Great, who had conquered most of Syria and Palestine, at Raphia.

Ptolemy V. (Epiphanes), only son of the above, reigned from 205 to 181 B.C. Under his reign Egypt lost most of her foreign possessions.

Ptolemy VI. (Philometor), elder son of the above, reigned from 181 to 146 B.C. In 170 Antiochus of Syria conquered most of Egypt, but retired, being unable to take Alexandria.

Ptolemy VII. (Euergetes II., nicknamed Physcon), brother of the above, reigned from 146 to 117 B.C. He gained the throne by murdering Philometor's son, Ptolemy.

Ptolemy VIII. (Soter II., commonly called Lathyrus), son of the above, reigned from 117 to 107 B.C., in conjunction with his mother Cleopatra. In 107 she raised a rebellion against him, and reigned along with his brother Alexander until 90, when the latter murdered her. In 89 Lathyrus returned and expelled Alexander; he then reigned until 81.

Ptolemy IX. (Alexander), was the Alexander just mentioned above. Ptolemy Alexander II., son of the above, succeeded Ptolemy VIII. in 81, but the people put him to death in 80 B.C.

Ptolemy XI. (Auletes), was an illegitimate son of Lathyrus; he reigned from 80 to 51 B.C. He spent great sums in getting the Romans to recognize his title.

Ptolemy XII., the eldest son of the above, reigned in conjunction with his sister, the famous Cleopatra. He reigned from 51 to 47 B.C. Cleopatra was expelled by her brother's minister, Pothinus, in 48 B.C. She raised an army in Syria, and was about to invade Egypt when Julius Cæsar arrived; her charms won him to her side. Thereupon Pothinus raised Alexandria against him. Ptolemy escaped from Cæsar's custody, and joined the insurgents, but was defeated, and drowned in an attempt to escape after the battle.

Ptolemy XIII., youngest son of Auletes, was

made king by Cæsar after his brother's death; he was to marry and reign in conjunction with Cleopatra, but in 43 she put him to death. Cleopatra herself was then queen of Egypt, along with Antony, until her death in 30 B.C. With her the family became extinct. Consult Budge's *History of Egypt*.

**Ptomaines**, a term formerly applied to alkaloids produced by decomposition of body tissues; now also applied to alkaloids formed in the body during life and especially to such as are formed in the intestinal canal, either introduced from without or generated within the body. They are transitional products in the processes of putrefaction and are due to the action of bacteria. At one time, most cases of poisoning through foodstuffs were thought to be due to ptomaines. Recent investigations, however, have shown that they are mostly due to certain specific bacteria, and then follow the introduction either of the bacteria themselves (infection), or of the poisons produced by the bacteria (intoxication). Meat poisoning has three varieties: that from meat of diseased animals; that from putrefied meat; that from 'sausage poison.' Poisoning from fish and oysters, cheese, ice cream, potatoes, and canned goods, is usually due to infection of the food by bacteria. In general, persons so poisoned become ill within a few hours after taking the food, with vomiting, diarrhœa, headache, cramps, and symptoms of collapse.

**Ptoxis**, in medicine, a term generally used for a drooping of the upper eyelid. It may be present from birth, or may arise later from various causes. Ptoxis of the stomach, whereby it falls into a lower position in the abdominal cavity, is termed gastroptoxis; ptoxis of a loop of intestine is termed enteroptoxis.

**Ptyalin**, the amylolytic (starch-changing) ferment of saliva. It is present only in very minute quantities.

**Puberty**, that period of bodily development in man and woman which lies between childhood and adolescence. It marks particularly the commencing development of the reproductive system, which is not fully matured until several years later. At puberty, in the woman, menstruation sets in, and the form begins to develop. The boy's voice breaks, and after a varying interval assumes a register generally an octave lower than before.

**Pubes**, in anatomy, the front boundary of the true pelvic cavity. It is formed by the junction of the two innominate bones. See PELVIS.

**Public Accountancy** is the name given to accounting work of a professional nature, wherein the accountant offers his services to the public for compensation. The public accountant differs from the bookkeeper, in that his qualifications are of a more expert nature.

New York was the first State to recognize the profession in this country, and provision for it was made in 1896 by 'an act to regulate the profession of public accountants.'

The work of the public accountant consists generally in making audits, investigations, and examinations. The work in general consists in checking and proving the cash receipts and disbursements, obtaining certificates from banks where funds are on deposit, and reconciling the balance with that shown by the cash book.

Investigations differ from audits in that they are usually conducted for some special purpose. Rather than to prove the correctness of the bookkeeping, they are for the purpose of determining whether or not officers and other employees of a concern are capable, have used good judgment, and have been faithful to their trusts and duties. Examinations, like investigations, are conducted for special purposes.

The report of the public accountant depends upon the nature of the engagement. In an audit he usually submits a balance sheet and a statement of the income and profit and loss, to which he certifies as being correct, and which he accompanies with comments. In investigations, examinations, and special engagements the form of his report depends on the circumstances in each particular case, and his certificate is so framed as to cover specifically the work which he has done.

Each State in the Union has its own Public Accounting law. See **BOOKKEEPING**. Consult *Journal of Accountancy*; *Dicksee's Auditing*; also *Bibliography of Works on Accounting by American Authors* (1934), by Harry C. Bentley and Ruth Leonard.

**Publicani, or Publicans**, in ancient Rome were contractors for public business generally, such as bridge or road making, but particularly for the farming of the state revenues, the collection of which was let out by the censors to the highest bidder.

**Public Health, or State Medicine**, means the practice of preventive and protective medicine under the direction of the community, state, and nation. It is a co-operative enterprise in which official and unofficial agencies join forces for the prevention of premature death, the reduction of

disease, and the promotion of physical and mental health and efficiency in the community and the individual. The conservation of the public health is one of the essential functions of government; therefore local health departments possess unusual powers to control individuals in a community.

With the gradual elimination of the pestilences due to environmental filth, and with the growth of the science of bacteriology, the attention of the public health administrator at the end of the 19th century turned to the control of the diseases which spread directly from one individual to another by personal contact. Isolation of cases, bedside sanitation, control of carriers, and vaccine and serum therapy made possible notable advances in the suppression of maladies of this type. Among outstanding achievements of public health work may be mentioned the conquest of yellow fever in Cuba and the Panama Canal Zone, the control of pellagra, beri-beri and hookworm diseases in the southern United States; and the wonderful transformations accomplished in Porto Rico and the Philippines.

Sanitary administration in the United States is a function of the National, the State, and the local government. The Public Health Service under the Treasury Department is the most important national bureau dealing with health. It is now housed in a new administration building on Constitution Ave., Washington, D.C., completed in 1933 at a cost of about \$1,000,000. In charge of its work is Dr. Hugh S. Cumming, Surgeon General, U. S. Public Health Service. The Department of Agriculture's chief interest centers in foods. Its Bureau of Chemistry enforces the Pure Food Law; its Bureau of Animal Industry places the stamp of government approval upon wholesale meat and dairy products; its Bureau of Entomology wars against disease-carrying insects; its agents go into rural districts to educate the people in such public health matters as farm water supply, sanitation, etc. The Department of Labor seeks to improve the physical conditions of workers. It controls immigration, administers the quarantine laws, and makes medical inspections. Its Children's Bureau is active in such matters as the birth rate, infant mortality, juvenile courts, orphanages, desertion and child labor. The Department of Commerce collects statistics showing prevalent diseases and the success of the fight against them. The Department of the Interior through its Bureau of Education



conducts school surveys and furnishes bulletins and lectures on health teaching.

State departments of health, operating under State-wide sanitary codes, work in fields not specifically dealt with by the Federal government. The principal agency in the campaign for public health is the local health department. Sanitary codes provide the local commissioner of health with police powers. State expenditures for health purposes vary greatly between states, but in 1939 reached about 10 cents per capita. Included in the services of municipal health departments are: health education, the taking of vital statistics, prevention of communicable diseases, maternity and child hygiene, public health nursing, laboratory service, milk and food control, sanitary inspection, and industrial hygiene.

The most important function of the health department is the education of the public in the principles of healthful living and disease prevention. The Model Vital Statistics Law, or one which was similar, was in force in 1939 in all of the states. It provided for a central bureau of vital statistics in the State health department and local registrars in primary registration districts to register births, marriages, and deaths. Only from such statistics can the points of profitable attack be discerned and the fruitfulness of various preventive measures be estimated. See *VITAL STATISTICS*.

The Bureau of Communicable Diseases includes the control of tuberculosis and venereal diseases, for which separate divisions are provided, and the control of the acute communicable children's diseases and of diseases of a communicable nature. In many diseases the use of sera, for the cure of those affected, or for the protection of those who have been exposed, plays an important part in the program of practical control. Diphtheria antitoxin and toxin-antitoxin or toxoid, vaccines for typhoid, paratyphoid and smallpox, antitetanic serum, antimeningococcus serum, and the Schick test must be freely available to physicians and for distribution by the division of communicable diseases. Immunization campaigns have been undertaken with marked success to combat diphtheria in New York State, New Jersey, and elsewhere.

Tuberculosis is of particular importance because of its chronic character, because it usually affects family groups, particularly in young adult life, and because it is one of the principal causes of death. Control depends upon two distinct sorts of measures, those

designed to prevent the dissemination of the infectious agent and those directed toward the upbuilding of the vital resistance of exposed individuals. Tuberculosis, if taken in time, is curable. It is essential, therefore, to conduct a far-reaching educational campaign to familiarize the public with the early symptoms of the disease, and should provide dispensaries where those who fear that they are suffering from tuberculosis may go for diagnosis and medical advice. An intelligent attempt to remove unsanitary living and working conditions is important in the anti-tuberculosis movement.

Another phase of public health work which requires special machinery for its effective development is the campaign against venereal disease, which is prevalent to an alarming degree in civilian life. The early detection of gonorrhoea and syphilis followed by efficient treatment is vitally important to effect their cure and prevent their further dissemination. All reported contacts should be examined; adequate follow-up of all cases is necessary. Several States require the reporting by name, others require reporting by number only. Public Health Laboratories of both State and local departments of health should be prepared to make free diagnosis by microscopic and cultural methods of diphtheria, tuberculosis, typhoid, paratyphoid, malaria, and other diseases, to conduct other laboratory work in the detection of disease, to examine water, milk, and other foods, to make urinalyses for health clinics, to examine pathological specimens, and to keep in stock antitoxins and vaccines.

The protection of the health of mothers and young children is perhaps the most important of all possible lines of public health endeavor. There should be prenatal clinics where prospective mothers may receive directions regarding the care of themselves and their babies. Field nurses must be available at time of delivery. Midwives must be licensed. An astonishing number of school children are found to suffer from defects of eyes, ears, teeth, or the upper respiratory tract, and often the fitting of a child to glasses, the securing of needed dental care, or the removal of tonsils or adenoids effects a complete revolution in general health, happiness, and educational progress. In some cities special school clinics furnish medical, surgical, and dental care without charge.

The chief functions of a bureau of sanitation concern problems of water supply, sewage disposal, sanitation of public buildings

and industrial establishments (lighting, heating, ventilation, etc.), supervision of swimming pools, bathing beaches, barber shops, control of insect carriers, etc.

The milk supply of a large city is a difficult problem of the health department. Proper supervision involves the inspection of the farms where the milk is produced, of the conditions under which it is transported and under which it is handled in retail stores. Pasteurization should be defined by law and all milk, except that of certified grade, should be pasteurized. The United States Public Health Service has published *The Standard Milk Ordinance* as an aid to inspection. All milk to be sold raw should be tuberculin tested.

The latest conception of State Medicine—free medical treatment for everyone at his earliest need—comes nearest to fulfillment in Soviet Russia, where the following point of view obtains: The Soviet government is a government by the workers and the health of the workers is the responsibility of the workers. The logical outcome of this conception is the disappearance of all private hospitals and of all private practice. Medical institutions and the treatment of disease were at once made a state function under the People's Commissariat for the Protection of Health. All doctors, nurses and pharmacists became civil servants; all hospitals, sanatoria and drug stores became state institutions; unified schemes of medical work were put in practice: nation-wide programs of child welfare, venereal disease and tuberculosis control were applied; medical instruction for doctors was provided; and wholesale production and purchase of drugs became a state business. It is thus intended to make free medical help accessible to all citizens. All salaried workers and their families, all wounded ex-soldiers, all school children, and the poorest of the peasants hold health insurance.

Every possible device is used for the purpose of selling health to the people. For those who cannot view the city health exhibits, traveling exhibitions are maintained which go in railway cars, automobiles, or vehicles drawn by horses, reindeer, or camels, carrying moving pictures, lectures, little plays, posters and literature to the very doors of the people. The radio is extensively used for health education.

**Public Health Service**, a bureau of the Treasury Department of the United States, the largest Federal agency dealing with public health. Its activities include the protection of

the United States against the introduction of disease from without, the medical examination of all arriving aliens, the enforcement of interstate quarantine and the suppression of epidemics, coöperation with State and local health departments in public health matters, investigation of the diseases of man, control of interstate commerce in bacteriological products, promotion of health education, maintenance of marine hospitals and relief stations, the maintenance of narcotic farms for the confinement and treatment of drug addicts, and the provision of medical service in Federal prisons.

This service dates from July 16, 1798, when Congress created the Marine Hospital Fund. In 1872 the Marine Hospital Service was reorganized and in 1902 its name was changed to Public Health and Marine Hospital Service; in 1912 it became the Public Health Service. In 1918 the Division of Venereal Diseases was created and in 1930 the Division of Mental Hygiene. Under the quarantine laws, the Surgeon-General, with the approval of the Secretary of the Treasury, formulates rules and regulations for the government of maritime and interstate quarantine. Under the health provisions of the Social Security Act of 1935 and the Venereal Disease Control Act of 1938, national, state and local health services are co-ordinated.

**Public Lands of the United States.**—The public lands came into the nation's possession in several ways. The Revolution transferred to the United States all the territory of the original 13 colonies and all the land w. of them to the Mississippi. Those States claiming the country n.w. of the Ohio River were in controversy as to boundaries, and were regarded with jealousy by States whose charters confined them to the coast. Maryland refused to ratify the Articles of Confederation, forcing the cession of this 'Northwest Territory' to the Union, which was followed by cession of the lands s. of Kentucky by the States claiming them, and by the Louisiana Purchase (1819); the Oregon acquisition (1846); the Mexican cession (1848); the Texas Purchase (1850); the Gadsden Purchase from Mexico (1853), and the Alaska Purchase (1867). The total area was slightly under one and one-half billion acres. Over it the Federal Government was originally both sovereign and landowner.

At first, lands were sold chiefly with a view to profit. In 1812 the office of General Commissioner of the Land Office was created, under the Treasury Department. In 1846 the

Land Office was placed under the Department of the Interior. A Pre-emption Law authorized any settler to purchase 160 acres after a fixed term of residence. Finally, the Homestead Act of 1862 (still in force with amendments) gave 160 acres of surveyed agricultural land to adult citizens and heads of families upon proof of five years' residence and cultivation, without payment, except certain fees ranging from \$10 to \$50. The Pre-emption and Homestead Laws fulfilled the first requisite of a sound public-land policy by creating a large class of small farmers, each cultivating his own land. But they were ill adapted to the arid region w. of the 100th meridian, where irrigation was, until the later application of 'dry-farming' methods, essential to tillage. Without tillage the grazing of cattle or sheep was the only means of agricultural production, and vastly more than 160 acres was necessary to sustain sufficient live stock for the support of one family.

Several laws were passed to meet the new conditions. In 1894, the Carey Act granted 1,000,000 acres to each of certain States for irrigation at State expense, and sale to actual settlers in 160-acre tracts at cost. This, in the main, has worked well, and additional grants have been made to several of the States. In 1902, the Federal Government undertook ('Reclamation Act') to build irrigation works on its own account, assessing the cost, on a uniform acreage basis, upon homesteaders taking up the land, payment to be made in ten annual installments.

In the beginning, mineral lands were reserved from sale and leased for royalties. The remoteness and inaccessibility of the frontier, the rudimentary social and political organization, and the complete ascendancy of unrestrained individualism combined to break down this system in the second quarter of the nineteenth century. Mineral lands were then taken up under the agricultural settlement laws. The priceless iron deposits of Minnesota, now held by the United States Steel Corporation, were sold for a nominal price, or given away; while the State, from the small fraction given to it, has accumulated a vast education fund.

Surveyed coal lands were sold (Act of 1872) at not less than \$20 per acre, if within 15 miles of a railroad, and not less than \$10 if more remote. Each person was limited to one entry of 160 acres for his own use. In 1906 all known deposits were withdrawn from sale by President Roosevelt. An act of Feb. 25, 1920, withdrew all mineral land con-

taining coal, oil, oil shale, gas, phosphate, and sodium, pending the enacting of a leasing bill and imposed a royalty burden of from 2 to 50 per cent.

Timberlands were first taken up under the settlement laws. The wonderful white pine forests of the Lake States, which under conservative cutting would have been a perpetual source of supply, passed into private ownership at nominal prices, or, seized without color or title, were ruthlessly swept away by axe and fire. Not until 1908 were such lands appraised and sold above the minimum price. The supply was then nearly exhausted. During the Roosevelt administration the Forest Service ran a race with the timber grabbers, and swept into National Forests, by Presidential proclamation, the greater part of their present area (about 175,000,000 acres); but the most valuable timber had been lost before the race began. Under an Act of 1901 the Forest Service could lease water-power sites for a uniform rental of \$1 per horse power, under conditions deemed necessary to restrict monopoly, for such uses as municipal supply and irrigation, for electric power, revocable rights for dams, reservoirs, conduits, etc. Under an act passed in 1911 rights of way for transmission lines might be secured for a period of 50 years.

Land grants have always been made to new States for the support of common schools. Other grants have been made in aid of other State institutions. Vast grants have been made, first through the State, then direct to private corporations, in aid of canals and other public works, especially railroads. Frauds have been practised under nearly all the public land laws. Under President Roosevelt, a Public Lands Commission was appointed to investigate the subject and recommend legislation. In 1910 it was enacted by Congress that the President may at any time in his discretion temporarily withdraw from disposition any of the public lands of the United States, including Alaska, and reserve the same for water-power sites, irrigation, classification of lands or other public purposes, such withdrawals or reservations to remain in force until revoked by him or by act of Congress. The following year the Appalachian Forest Reserve Act was passed which made an appropriation of \$11,000,000 in annual installments for five years, for the purchase of land for national forests on the watersheds of navigable streams, when such forests will tend to promote the navigability of such streams.

To June 30, 1941, the U. S. Government had made disposal from the public domain in the United States proper of some 285,000,000 acres of land as homesteads, some 420,000,000 acres in cash sales and some 325,000,000 acres in grants to states, railroads, etc.; and title remained in the United States to some 411,096,048 acres, made up principally of National forests, Indian reservations, National parks, military and naval reservations, and lands unappropriated or withdrawn.

**Public Libraries.** See **Libraries.**

**Public Meetings.** In the United States there are no laws against the holding of public meetings, provided they are for legitimate purposes, and are conducted in an orderly manner. However, the ordinances of most towns and cities require the organizers of a public meeting to obtain a permit from the proper authority if the meeting is to be held on the streets or other public place.

**Public Parks.** The term Public Park is very general in its application, being used alike to designate such limited areas as a square or triangle at the intersection of two or more city streets, which has been set aside for the rest and enjoyment of the people, and to describe such vast and lonely tracts as those set apart for the public by the national government in the valley of the Yellowstone and of the Yosemite. The one respect in which a public park differs from any other area of land is that its primary use is for recreation or rest out of doors. A Public Garden differs from a park in that it is dedicated more particularly to the culture of shrubs, flowers, and trees, for their own sake; but often the terms are used interchangeably.

In New England cities the oldest public park is usually the 'common,' set aside as a grazing ground when the place was settled. This common or green is characteristic not only of the cities, but of the older New England villages. Most famous is the Boston Common which was the first to be set aside for outdoor recreation (1634). The movement to secure large public parks began with the acquisition of Central Park by the City of New York in 1853. This was the earliest landscape park (840 acres). Philadelphia followed the example set by New York by securing its magnificent Fairmount Park in 1867 (2,816 acres); and Boston secured Franklin Park in 1883 (527 acres). In 1895 Essex County, New Jersey, pioneered in providing a park system on a county-wide plan and by 1930, 74 counties had parks. Of particular in-

terest is the system in Westchester County, New York, which has a number of excellent connecting roadways. Cook County, Ill., is the other outstanding example of county park systems. Interstate parks are owned jointly by two or more States as in the case of the Palisades Interstate Park along the Hudson in New York and New Jersey and the wilderness trail planned to run from Maine to Georgia. The Boston Metropolitan Park System is extensive and varied and includes 39 cities and towns and is administered by a commission.

State parks are intended to preserve areas of scenic, historic, scientific, or recreational value. Among the largest State parks are the Adirondack and Catskill parks in New York State, together containing some 2,400,000 acres. In 1865 California obtained from Congress a grant of the famous Yosemite Valley as a State park and it remained such for 30 years until taken over by the Federal Government. The American side of Niagara Falls became a State reservation in 1885 and in the same year a beginning was made in the Adirondack reservation in New York State and Fort Mackinac was taken by Michigan for a State park.

**Public Policy,** a phrase commonly employed to designate a general principle of law that no one has a right to do any act which will work harm to the public. This principle is applied in many cases where the act is not specifically prohibited nor recognized as a criminal offence. It has been most frequently applied in the law of contracts. Some of the principles of law which have been evolved by the courts on the grounds of public policy have been incorporated into statutes in many States. The limits of this doctrine are not yet clearly defined.

**Public Schools,** a term applied in the United States to schools open to all, maintained by public expenditure, and controlled by an authority representative of the public. Since the function of a public school system is to secure an educated citizenry, the conception of public responsibility in education has been accompanied by an extension of the requirement of compulsory attendance at least during the period covered by the elementary schools—usually to the age of fourteen, although by statute a number of States may require compulsory attendance of pupils, not suitably employed, up to the age of sixteen. The development of compulsory school attendance has always been followed by restrictions on the employment of children or

der fourteen; and in some instances minimum standards of education must be attained by minors between the ages of fourteen and sixteen before they are permitted to take up employment. Another recent tendency is the provision of medical inspection and treatment of school children, together with close attention to hygiene, sanitation, and other aspects of a similar nature in the construction of school buildings.

The evolution of this public school system has been gradual. The public elementary school, in the sense of a school maintained out of public funds, appeared as early as 1636 in Boston and 1638 in New York. But

Service Corporation have been used to denote a concern performing for a municipality, for pay, one or more of the public services which the town or city might itself perform—such as the supplying of gas or electricity, or the furnishing of means of transportation and communication (see LOCAL GOVERNMENT; MUNICIPAL OWNERSHIP). Under the term 'public utility' are commonly included steam and electric railways, bus and steamboat lines, express companies, grain elevators, public warehouses, telephone and telegraph systems, water companies and water departments, electric central stations, gas supply works, pipe line companies, district steam



*Central Park Pool, New York City.*

the modern conception of the public school arose only about the middle of the last century. The first public high school was established in Boston in 1821, the first public evening school in Louisville in 1834, and the first public kindergarten in St. Louis in 1873. A compulsory attendance law was enacted in Massachusetts in 1852, and eleven other States followed between 1867 and 1874. The public school is the characteristic educational institution of the United States. To it are sent nearly ninety per cent. of the school population. See EDUCATION IN THE UNITED STATES; EDUCATIONAL SYSTEMS, NATIONAL; SCHOOLS, PRIVATE.

**Public Utility Regulation.** In recent years the terms Public Utility and Public

heating systems, sewage disposal companies, and radio.

The present era of utility regulation may be said to have begun with the establishment of the Massachusetts Gas and Electric Light Commission in 1885 and the Interstate Commerce Commission in 1887. The Interstate Commerce Act, strengthened by various amendments, was more or less the model of many State commission laws—obviously influencing even the Wisconsin and New York measures secured under the leadership of Governors La Follette and Hughes in 1907. The success of these two measures in meeting with the demands of the time led other States to establish more or less similar bodies, or to enlarge the powers of old ones.

Growing out of the long continued period of reduced railroad earnings, the Interstate Commerce Commission, in March 1938, granted rate increases on certain railroad freight classifications designed to bring about an increase of yearly income to extent of some \$270,000,000. The Commission also granted the railroads privilege to advance passenger fares to extent of one half cent per mile, but this proved unsatisfactory to the railroads and they soon of their own volition re-established the former rate of two cents per mile in order to try to regain as much business as possible lost by them to busses and to other means of transportation. A committee of the Interstate Commerce Commission considering the difficult position of the railroads, recommended extensive loans by the Reconstruction Finance Corporation to the railroads and the establishment of an Authority to compel railroads to enter into arrangements to pool traffic and earnings. There was a report on Dec. 28, 1938 by a committee of three railroad executives and three labor leaders who had been appointed by Pres. Roosevelt to make a study of the plight of the railroads. This report favored the bringing of all modes of transportation under uniform regulations, and fixing bus rates so high as to include interest on the cost of public roads, and barge rates to include cost of waterways.

The Roosevelt administration has given special attention to public regulation of utilities. It has also gone forward with the great Tennessee Valley project and its subsidiary activities reaching into agriculture, animal husbandry, reforestation and the development of new uses for electricity. Grants and appropriations for this project, 1933 to 1940 inclusive, amount to upward of \$309,000,000. The Tennessee Valley Authority is a government agency and makes electricity available for sale to municipalities, power companies and industrial concerns. In 1940, electric current generated by it was being supplied to some 335,000 domestic consumers. The administration dubbed the project a yard stick for measurement of rates charged by utility corporations, but thoughtful citizens were none the less aware that public utility corporations are not financed by taxes levied on the general public, as is this experimental project.

**Publishing and Bookselling.** Modern publishing is a specialized development of bookselling. In the height of its intellectual activity, Athens had an organized book trade,

which is said to have taken its rise from the practice of Plato's followers, who reported the lectures of the master, and either lent out the manuscripts for hire or sold them outright. After the conquest of Greece by Rome the Athenian book trade grew considerably, owing to the demand for Greek books by the Romans. The great book mart of ancient days, however, was at Alexandria, where the production and sale of books were carried on in connection with Ptolemy's museum. For more than two centuries after B.C. 250 Alexandria was the center of book production for the whole world.

A new impulse to book production and selling was imparted by the demand for copies of the Gospels arising out of the spread of Christianity. As a result, the bookselling industry passed to the *scriptoria* of the monasteries. By the middle of the thirteenth century we find the universities supplanting the monasteries in the production and sale of books.

The introduction of printing is the great outstanding event in the history of publishing. In the United States it is not unusual to find the two trades combined, as in New York City, where a large retail business in the books of other houses, as well as in their own, is done by some publishers.

The settlement of the American Colonies involved too strenuous labor on the part of the colonists for them to spend much time in reading; and up to the establishment of Stephen Daye's press at Cambridge, Mass., in 1639, and for many years after, there was little demand for printed matter. The first regular bookseller of whom there is any account was Hezekiah Usher of Boston, known to have been in the business as early as 1652. The manufacture of printing presses was not well established in this country until 1775, and Franklin's type foundry, started in the same year, was but the third in America.

With these hampering conditions, and with Indian wars and the manual work necessary for the development of the country, it is not surprising that out of nearly 8,000 extant titles of publications issued previous to the Revolution, nine-tenths should be tracts or pamphlets. Many of the latter were almanacs—that of Franklin being a notable example. Mathew Carey began business as a printer in Philadelphia in 1785, and as a bookseller in 1791, soon afterward issuing publications of his own. He published the first American 'best seller,' *Charlotte Temple*, by Mrs. Rowson. The Methodist Book Concern was es-

published in 1789; Harper & Brothers in 1817; William D. Ticknor (precursor of Houghton, Mifflin & Co.) in 1832; J. B. Lippincott & Co. in 1835; G. P. Putnam (as Wiley & Putnam) in 1836; Little Brown in 1837. In 1891, after years of effort, the first international copyright law was enacted by Congress. The effect of this measure was markedly to stimulate American book production, encouraging both native literary talent, and the development of the mechanical side of book making.

Into the making of a book go many arts: (1) paper-making, (2) type design and typography, (3) book layout and designing, (4) binding, (5) jacket layout and designing, (6) book illustration.

On the day published two copies of a book with application for copyright are sent to the Library of Congress; also copies to the trade book indexes of new books. Sewed but unbound advance copies are often sent to reviewers in order to secure reviews on 'publication date,' which is sometimes as soon as the book may be printed and bound, but often some time later, with an interval for advance presentation, in fully bound form, to reviewers, jobbers, booksellers, book clubs, or influential individuals.

The 'book clubs' have become prominent factors in bookselling. Their boards of book judges select each month a particular book which they offer or send to their patrons, numbering from 10,000 to 60,000, and these patrons have the privilege of securing the selected book each month promptly and at a saving. The book clubs usually print a special edition of the book, carrying their own imprint. The 'lending libraries' are a large factor in bookselling in America, and quite dominant in England. For 15 to 25 cents per book these lending libraries give readers the privilege of a week's possession.

Specialized book stores dealing in children's, business or other types of books have sprung up; also traveling bookstores on trucks. Mail order book selling has been quite successful. Book stores, drug and stationery stores are enjoying a wide sale of reprints, omnibus books, and low priced series of classics and new books. Remarkably cheap editions of certain types of books for the 5 and 10 cent stores have also appeared.

Second-hand bookselling is a very large business, using bookstalls, display rooms, catalogs, etc. Chains of these have sprung up.

Rare bookselling is in a class entirely by itself, appealing to a limited coterie of wealthy collectors, through dealers, auctions, catalogs. For centuries London was the world headquarters of the rare book trade, the auctions at Sotheby's being a focal center. Since 1911, when the famous Hoe collection was sold, New York has been the acknowledged world headquarters for rare books.

Historic best sellers, from a list compiled (1934) by the Institute of Arts and Sciences: *In His Steps*, C. M. Sheldon (1899), 8,000,000; *Freckles*, Gene S. Porter (1904), 2,000,000; *Ben Hur*, Lew Wallace (1880), 1,050,000; *Girl of the Limberlost*, Gene S. Porter (1909), 1,700,000; *The Harvester*, Gene S. Porter (1911), 1,600,000; *Tom Sawyer*, Mark Twain (1875), 1,500,000; *The Winning of Barbara Worth*, Harold Bell Wright (1911), 1,500,000; *Laddie*, Gene S. Porter (1913), 1,500,000; *The Virginian*, Owen Wister (1902), 1,454,000; *The Call of the Wild*, Jack London (1917), 1,412,000; *Story of the Bible*, Jesse L. Hurlbut (1904), 1,321,000; *The Trail of the Lonesome Pine*, John Fox (1909), 1,255,000; *David Harum*, Edward N. Westcott (1900), 1,200,000; *The Little Shepherd of Kingdom Come*, John Fox (1903), 1,100,000; *Five Little Peppers and How They Grew*, Margaret Sidney (1881), 1,090,000; *Huckleberry Finn*, Mark Twain (1884), 1,000,000; *Pollyanna*, Eleanor Steward (1913), 1,000,000; *Black Beauty*, Anna Sewall (1877), 1,000,000; *Treasure Island*, R. L. Stevenson (1894), 1,000,000; *Trilby*, George du Maurier (1894), 1,000,000. More recent are: *Anthony Adverse*, Hervey Allen (1933); *Gone With the Wind*, Margaret Mitchell (1936); *Northwest Passage*, Kenneth Roberts (1937); *Grapes of Wrath*, John Steinbeck (1939). See BOOK; BOOKBINDING; COPYRIGHT; MAGAZINES; NEWSPAPERS; PRINTING.

**Puccini, Giacomo** (1858-1924), Italian operatic composer, was born in Lucca, Italy, of a long line of musical ancestors. In *Manon Lescaut* (Turin, 1893) and *La Bohème* (Turin, 1896), the latter his most popular work, he struck a new note of individualism. *Tosca* (Rome, 1900) and *Madame Butterfly* (Milan, 1904) followed, greatly adding to his prestige. Later works, however, failed to show the growth that was looked for—*La fanciulla del west* ('The Girl of the Golden West') (New York, 1910) and three one-act operas. Puccini was especially happy in the creation of facile appealing, singable melodies of warmth and spontaneity. He had also

a distinct orchestral sense that enabled him to create effects rich and coloristic. On these two elements his popularity rests.

**Puck, or Robin Goodfellow**, a merry domestic sprite, famous for his mischievous pranks and practical jokes. Shakespeare introduces him into *A Midsummer Night's Dream* as the jester to King Oberon.

**Pudding-stone**, a rock made up of the water-worn *débris* of other rocks, many of the pieces being of the size of pebbles or larger.

**Pudsey**, municipal borough of the West Riding of Yorkshire, England. It is noted for its manufacture of woolen and worsted goods and leather work; p. 14,762.

**Puebla**, state, Mexico. It has an area of 12,992 sq. m. It is generally mountainous and broken in the northern part, with swiftly flowing rivers which afford abundant water power. Within its borders are the snow-capped peaks Popocatepetl and Ixtaccihuatl, which add sublimity to the scenery, and several ancient remains, including five pyramids, the largest being that of Cholula; p. 14,734.

**Puebla**, city, Mexico, capital of the state of Puebla. It has an elevation of 7,077 ft. in a broad, fertile plateau. It is the third city in size in Mexico, with ancient fortifications and broad streets lined with handsome buildings. The city is noted for its cleanliness and healthfulness, and has many foreign residents. The city is the commercial and distributing center of the state. It manufactures woollens, paper, glass, iron products, pottery, structural tiles, leather, and straw hats. Puebla was founded in 1530; p. 95,535.

**Pueblo**, a Spanish word having the general meaning of town.

**Pueblo**, city, Colorado, county seat of Pueblo co., and second largest city in the State. Its fine climate attracts many visitors, especially in winter. Pueblo is the chief industrial and commercial city of Southern Colorado, and has an important trade in agricultural products and cattle. There are extensive oil fields near the city, deposits of coal and other minerals, and many mineral springs. It is the largest smelting center in the United States for gold, silver, copper, zinc, and lead; p. 52,162.

**Pueblos**, or **Pueblo Indians**, numerous groups of North American aborigines who have always dwelt in *pueblos* (Spanish, 'villages') or agricultural settlements, as distinguished from the roving 'plains Indians.'

Some of the houses are of adobe. They are famous basket and pottery makers and are credited with being the originators of the 'Navajo' blankets.

**Puelches**, the aboriginal Pampas Indians of Argentina, now nearly extinct. Of all the original natives of South America they most resemble the North American prairie Indians. They spoke a stock language, which died out after 1879, when these predatory bands were nearly exterminated by the Argentine forces.

**Puerperal Infection (Puerperal Fever)** includes all the various morbid conditions which are due to the entrance, during labor or the puerperium, of infective microorganisms into the female generative tract. At one time the disease was very common and had a high mortality rate. Modern antiseptics and medical hygiene have reduced the number of cases.

**Puerperal Insanity**, a term generally applied to insanity occurring during pregnancy, or the puerperium—the time of lying-in, or first few weeks after childbirth—or during lactation. It is generally of a melancholic type, with delusions and perversions of the natural affections. Recovery of eighty per cent. is the rule.

**Puerto Cabello**, seaport, Carabobo, Venezuela. As the shipping port it handles the products of a large section, exporting beans, coffee, cacao, cotton, hides, and skins, tobacco, dye woods, timber, and indigo; p. 14,099.

**Puerto de Santa Maria**, seaport, Cadiz, Spain. It is the principal place of export for sherry wines; p. 18,839.

**Puerto Plata**, town, republic of Santo Domingo. It is the chief port of Santo Domingo, and a military post, a cable station, and an important commercial center; p. 7,807.

**Puerto Principe**, the old name for **Camaguey**, province, Cuba. Its area of 10,500 sq. m. includes a few mountain ranges, 15 m. from the n. coast, where there are fine plateau grazing lands and important cattle-raising and horse-breeding industries. The chief agricultural product is sugar; p. 258,712.

**Puerto Principe**, the old name for **Camaguey**, city, Cuba. It is located in a broad, elevated plain, the center of the largest stock-raising industry of Cuba. There are also large sugar plantations in the vicinity. Puerto Principe was first founded in 1515 at Nuevitas, and moved to its present site in 1516. The town has had a long smuggling history, and was sacked in 1668 by the buccaneer Morgan. It was the seat of government for the Spanish



West Indies for a time after 1800, and a military post till the end of the Spanish-American War; p. 82,042.

**Pufendorf, Samuel, Baron von** (1632-94), German writer on history and jurisprudence, was born near Chemnitz, Saxony. Imprisoned on the breaking out of the war (1658) between Sweden and Denmark, he wrote his famous *Elementa Jurisprudentiæ Universalis*. On his release he was appointed by the Elector Palatine a professor at Heidelberg, and was afterward transferred to Lund in Sweden, where he published *De Jure Naturæ et Gentium* (1672), in which he improved on the speculations of Grotius.

**Puff-adder** (*Bitis arietans*), a highly poisonous African viper, which reaches a length of four ft. or more. It is yellowish to orange brown above, with dark, angular markings, checkered with white, and whitish below.

**Puff-bird**, a South American form related to the jacamar. It receives its English name from the puffy appearance of the soft feathers of the head.

**Puffin** (*Fratercula*), a bird genus of the auk family, characterized by the great development of the beak. The most familiar species is the common puffin or sea parrot (*F. ar-*



Common Arctic Puffin.

*tica*), which breeds on both shores of the North Atlantic—in America, as far s. as the Bay of Fundy. Its length is 13 inches; it is blackish above and on the throat, while the cheeks and under parts are white.

**Pug Dog**, a breed of small, short-haired lap dogs, probably of Oriental origin, and introduced into Europe by way of Holland in the sixteenth century. The breed is characterized by the shortness of the face and up-lifted form of nose. Only a fawn color, with

blackish face, was known until about 1875, when a wholly black variety was introduced into the West from China. Pug-dogs, popular about 1880, are now returning to public favor.



Pug Dog.

**Puget, Pierre** (1622-94), French sculptor, was born in Marseilles. His fine *Hercules* (Rouen Museum), *Milo* (Louvre, Paris), and *Andromeda* (Versailles) show a keen appreciation of natural beauty of form and moral grandeur.

**Puget Sound**, an arm of the Pacific Ocean, indenting the coast of Washington, and connected by the Strait of Juan de Fuca with Admiralty Inlet and Hood's Canal. Its bold and picturesque shores are well wooded. It abounds in edible fish of a hundred sorts, its salmon fisheries being famous. The cities of Seattle, Tacoma, and Port Townsend are situated on its shores.

**Pugilism.** See **Boxing**.

**Pugin, Augustus Welby Northmore** (1812-52), English architect, was born in London. He early became a Roman Catholic, and some of his best plans were drawn for churches, including the cathedrals at Killarney and Southwark. He had also a large share in the designs and plans for the new British Houses of Parliament (1836).

**Pulaski, Casimir** (1748-79), Polish soldier and American Revolutionary general, was born in Podolia, Poland. He was a volunteer aide to Washington at Brandywine, and was made a brigadier-general for gallantry. In the spring of 1779 he successfully held Charleston against the attack of General Prevost until reinforced, and harassed the latter's retreat to Savannah.

**Pulaski, Fort**, was erected by the U. S. Government on Cockspar Island, at the mouth of the Savannah River, for the defence of Savannah, Ga.

**Pulitzer, Joseph** (1847-1911), American

editor and publisher, was born in Hungary. In 1883 Pulitzer bought the *New York World*, making it the first successful exponent of popular journalism. In 1903 he endowed with \$1,000,000 a school of journalism in connection with Columbia University. By his will, Pulitzer left a second donation of \$1,000,000 to the School of Journalism, and \$250,000 as a Pulitzer Scholarship Fund. To the Metropolitan Museum of Art and the Philharmonic Society of New York he left \$500,000 each. Included in the endowment to Columbia was a fund from which prizes for excellence in stipulated directions are awarded annually in journalism and letters.

**Pulitzer Prizes**, a group of annual awards donated since 1917 by Joseph Pulitzer, who was publisher of the *New York World*. The prizes range from \$500 to \$2,000 and are given to the creators of the best American novel, play, book of poetry, historical work relating to the United States, outstanding newspaper reporting, newspaper cartoon, newspaper editorial and the biography engrossing good American citizenship. A group of judges of which Nicholas Murray Butler, president of Columbia University, is chairman, selects the winners.

**Pulitzer, Ralph** (1879-1939), journalist, president of the Press Publishing Company, publishers of the *New York World*, 1911-30; vice president of Pulitzer Publishing Company, publishers *St. Louis Post-Dispatch*, 1906-. He has written *New York Society on Parade* (1909); *Over the Front in an Aeroplane* (1915).

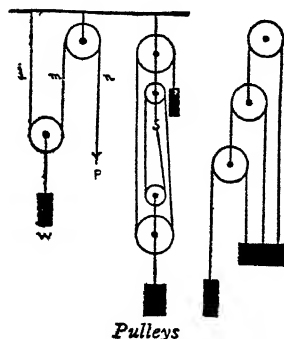


Ralph Pulitzer.

**Pulley.** The pulley, one of the so-called mechanical powers, consists of a grooved wheel or sheave capable of turning about its axis. It is sometimes placed inside a mass of wood or metal called the block. A fixed pulley gives no mechanical advantage, but mere-

ly alters the direction of the force applied in the tension of the rope that passes over the sheave. If a pulley or a peg be assumed to be frictionless, the tensions of the strings on both sides of it are equal. Thus the tensions of  $m$  and  $n$  are both equal, also the tensions of  $l$  and  $m$ ; and as these support  $w$ , the tension of each is  $\frac{1}{2}w$ , the strings being parallel.

**Pullman**, city, Washington. The State Agricultural College and School of Science are situated here. It is the center of a wheat and livestock producing district, and has numerous artesian wells; p. 4,417.



Pulleys

**Pullman, George Mortimer** (1831-97), American inventor and capitalist. In 1864 he built his first modern sleeping car, the 'Pioneer.' It was first used on the train which carried the body of President Lincoln to burial. The orders for new cars came so rapidly that in 1867 Pullman formed and became president of the Pullman Palace Car Co. In 1880 he founded the model town of Pullman, Chicago, and in 1887 the first vestibule train was turned out of the works. He was a promoter and president of the New York City elevated street railroad.

**Pulmotor**, an oxygen-fed and driven device for inducing artificial respiration in persons overcome by noxious gases, those apparently drowned, and others in whom breathing has been seriously impaired but who still have slight heart action.

**Pulpit**, originally that portion of the Roman stage (distinguished from the orchestra) on which the actors recited and performed their parts. It has since come to mean a piece of church furniture from which sermons, lectures, and other addresses are delivered.

**Pulque**, a native Mexican and Central American drink, prepared by extracting and fermenting the sap of the agave.

**Pulse** (Lat. *pulsus*, 'a pushing or beating'), a phenomenon due to the distention of the

arteries consequent upon the intermittent injection of blood into their trunks from the heart during its contraction period. It is perceptible to the touch in all excepting very minute arteries, and, in exposed positions, is visible to the eye. The pulse is usually examined at the radial artery at the wrist.

**Pulse**, a name commonly given to the edible seeds of leguminous plants, such as peas and beans.

**Pulsometer**, the name of a well-known and widely-used steam-pump. See **PUMPS**.

**Pulszky, Franz Aurel** (1814-97), Hungarian politician and writer, was born at Eperies. He was appointed under-secretary of State for foreign affairs in 1848, but under suspicion of revolutionary activities, fled to London, and later accompanied Kossuth to the United States. His works include, *Extracts from the Diary of a Hungarian Traveler in Great Britain* (1837); *White, Red, and Black* (1852), a description of his travels through the United States.

**Pulteney, William, Earl of Bath** (1684-1764), British statesman, was born in London. He started the *Craftsman* (1726), a journal devoted to the abuse and ridicule of Walpole.

**Pultusk**, town, Lomiza government, Poland. Here Charles XII. of Sweden defeated the Saxons in 1703, and here, too, was fought a drawn battle between the Russians and the French (Dec. 26, 1806); p. 13,742.

**Puma, Cougar, or Mountain Lion** (*Felis concolor*), the large American cat, or 'panther,' formerly to be met with anywhere from the St. Lawrence River and southern British Columbia to Patagonia, but now practically exterminated e. of the Rocky



Puma.

Mountains. When hunted with dogs (the usual method), it tries first to flee, and when overtaken climbs a tree, where it remains, snarling at the pack of dogs until the hunter comes up and despatches it, nevertheless, when cornered it fights to the death. Consult Theodore Roosevelt's *Pastimes of an American Hunter*; W. H. Hudson's *The Naturalist in La Plata and Idle Days in Patagonia*.

**Pumice, or Pumice Stone**, a light-colored, very porous volcanic rock, consisting practi-

cally entirely of glassy matter, resembling a vitreous froth. Its peculiar structure is due to the sudden expansion of great quantities of steam imprisoned in a molten lava when it reaches the surface and is relieved from the great pressure to which it had been subjected within a volcano. In some cases the expansion is so great and rapid that the rock is blown into dust, this being the origin of the great dust clouds which circle round the earth after the eruption of Krakatoa. Pumice is used as a polishing and smoothing material, also for cleaning surfaces, and in fine powder is mixed with soaps or used for brightening metals. The best quality is obtained from the Lipari Islands. In the United States the chief deposits are in Nebraska.

**Pumpelly, Raphael** (1837-1923), American geologist, born in Oswego, N. Y. He organized the economic geology department of the U. S. Geological Survey, and was a special geological agent of the tenth U. S. Census, 1879-81.

**Pumpkin**, an annual trailing plant sensitive to frost, and found in cultivation by the Indians when America was discovered. As commonly grown in the northern United States the fruits are yellow, with a hard rind, gourdlike in form, and more or less hollow. They are extensively used for making pies and for stock feeding.

**Pumps**.—A simple classification of pumps would be as follows: (1) Lift pumps; (2) force pumps; (3) combined lift and force pumps. A lift pump is one that gives motion to a fluid by lifting, without subjecting the fluid to pressure. A force pump, on the other hand, uses pressure to induce the flow of liquid. Any one of the foregoing types may be single-acting or double-acting. A single-acting pump discharges only during the movement of the piston or plunger in one direction, whereas a double-acting pump discharges during the movement of the plunger in each direction. Pumps may be either reciprocating or rotary, depending on the kind of motion given to the moving element; and according to position they may be either vertical or horizontal. Fig. 1 shows a double-acting bucket-and-plunger pump applied to the raising of water from a shaft of some depth.

To understand the action of this type of pump, suppose the plunger and bucket to be in their lowest positions, or at the bottom of the stroke, and let the pump rod move upward. The bucket c, as it is pulled upward with its valves closed, leaves a space or part-

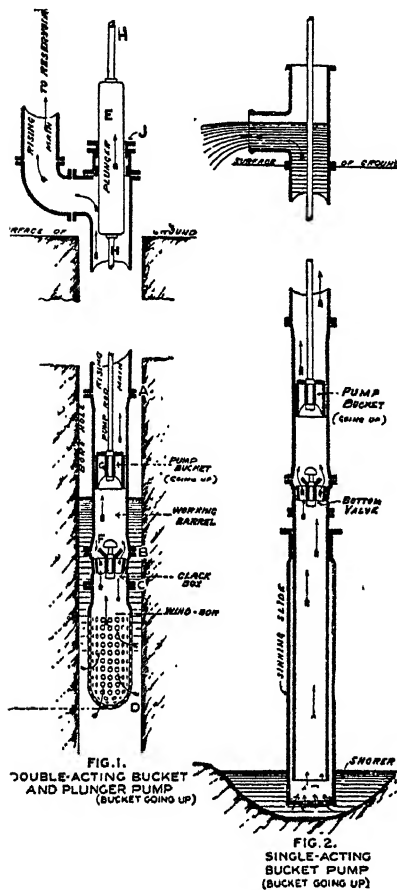
ial vacuum beneath, which is immediately filled with water forced in through the snorer and bottom valve *r*, by the atmospheric pressure acting on the surface of the water in the bore-hole. When the bucket reaches the top of its stroke its motion is reversed, and it

and so on, until the rising main is full up to the level of the outlet at or above the surface of the ground, and water commences to be discharged—a volume of water equal to the stroke of the pump times the cross-sectional area of the working barrel being then delivered at each double stroke.

As shown in Fig. 1, this pump is double-acting—i.e. it delivers water on both the up and the down stroke. This is effected by the use of the plunger *r*, which is a closed cylinder forming part of the pump rods. As the bucket moves up three ft., the plunger does the same, and half the water lifted by the bucket goes into the space left by the retreating plunger, and half goes up the rising main to the discharge. As the bucket goes down, the plunger follows, and, as the water beneath cannot escape downward, forces its own bulk of water up the rising main to the reservoir. In this manner half the total quantity pumped per double stroke is *lifted* on the upstroke, and half is *forced* on the downstroke.

The pump illustrated in Fig. 2 is of similar description, but is *single-acting*. The discharge is effected on the upstroke of the bucket, so that the pump is intermittent in its action.

**Direct-Acting Steam Pumps.**—A direct-acting pump is one in which the motion of the driving piston is transmitted direct to the water piston or plunger by a rod or rods. In its simplest form it consists of a steam end containing a reciprocating piston connected to one end of a piston rod, the other end being attached to the water plunger. Such a pump, known as a single pump or a simplex pump, is shown in section in Fig. 3. The pump is driven by steam which is admitted alternately on opposite sides of the piston by a valve located above the steam cylinder. When the piston nears the end of its stroke, it comes in contact with the stem of a small poppet valve in the head of the cylinder and lifts the valve. The opening of this valve releases the steam pressure on the end of the slide valve, and the unbalanced condition thus set up causes the slide valve to move, uncovering the steam port and admitting steam behind the piston. The piston is then driven to the opposite end of the cylinder by the action of the steam, until it strikes the poppet-valve stem at that end, when the motion is again reversed in the same way as before. The piston rod at its left end is fastened to the water plunger which is thus given a reciprocating motion. The pump is double-acting. When the plunger moves to the right, it



*Pumps.*

commences to descend. The water beneath it attempts to get back into the bore-hole, but is prevented from doing so by the bottom valve *r*, which immediately closes. The water is thus caught between the descending bucket and the valve, *r*, and, as it is practically incompressible, it forces the valve in the bucket *c* open. As the bucket descends, the water passes through it to the upper side.

When the second double stroke commences there is already three ft. of water above the bucket, at the commencement of the third stroke six ft., of the fourth stroke nine ft.,

draws water in through one set of suction valves and discharges through the discharge valves at the opposite end of the water cylinder. On its stroke to the left, it draws in water through the other set of suction valves and forces water out through the discharge valves at the other end.

A duplex pump, one form of which is shown in Fig. 4, is made up of the elements

mine shafts, filling storage tanks on the roofs of buildings, pumping oil, acid, or dirty or gritty water, and scores of other special forms of service.

**Power Pumps.**—A power pump is one in which the water piston or plunger is given a reciprocating motion through the agency of a crank and a connecting-rod or its equivalent. It may be simple, duplex, or triplex, ac-

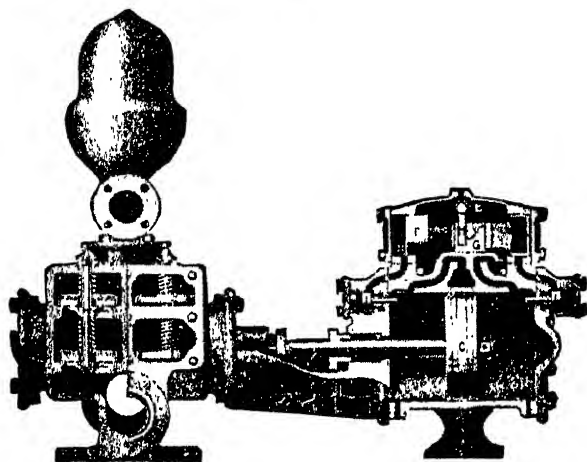


Fig. 3. Simplex Direct-Acting Steam Pump.

of two simplex pumps placed side by side and interconnected in such a way that the motion of the piston rod of one half of the pump gives motion to the valve gear of the other half. With this construction it is impossible for the pump to stop at dead center.

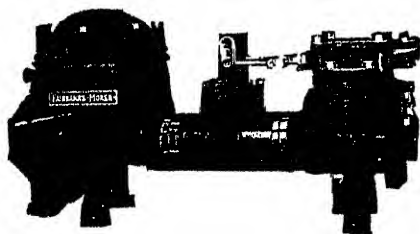


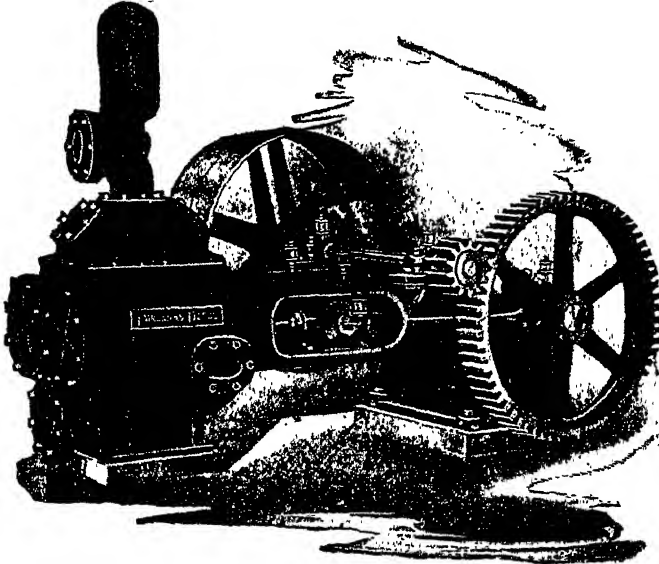
Fig. 4. Fairbanks-Morse Duplex Direct-Acting Pump.

Direct-acting steam pumps are used for a large number of purposes, as, for example, feeding steam boilers, supplying water to hydraulic elevators, removing condensate from steam condensers, furnishing water at high pressure to fire systems, removing water from

cording to the number of cranks used, and the motive power may be furnished by steam engine, gasoline engine, water wheel, electric motor, or belt from a countershaft; also, the pump may be either horizontal or vertical. In Fig. 5 is shown a horizontal duplex power pump. A belt on the tight and loose pulleys gives motion to the shaft carrying the pinion that meshes with the large gearwheel. The gear is keyed to the end of the crank shaft, which has two cranks. To each crank is attached a connecting-rod that leads to a cross-head fastened to the rod to which the water piston is secured. The cranks are 90 degrees apart and thus the discharge of the pump is practically continuous.

**Centrifugal Pumps.**—A type of pump that has been greatly improved in recent years, both in efficiency and in height of lift, is the centrifugal pump, so called because centrifugal force is an important factor in its operation. Briefly, it consists of a disk or wheel having vanes and rotating inside a casing. Water is admitted to the center of the rotating part, which is called the impeller, and under the effect of centrifugal force the water is thrown outward along the vanes, being fin-

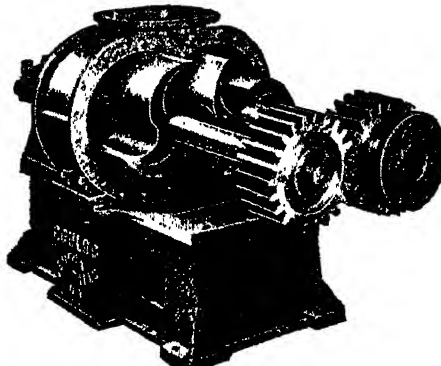
ally discharged from the circumference of the impeller into the casing. During its passage through the impeller the velocity of the water is greatly increased, and when it is discharged into the casing, the energy of motion due to displacement pump that has a rotary motion. One form is shown in Fig. 6, in which one end casing is removed to reveal the working parts. There are two shafts which are carried in bearings in the end casings. On these shafts



*Fig. 5. Fairbanks-Morse Duplex Power Pump.*

this velocity is converted into pressure, and the water is thus forced to considerable heights. In addition to the services already mentioned, centrifugal pumps are used as fire pumps, deep-well pumps, mine pumps,

are keyed two similar rotors, each having three lobes, and these rotate inside the pump casing. Outside the pump the shafts are connected by two gears of equal sizes. Water is admitted to the space below and between the

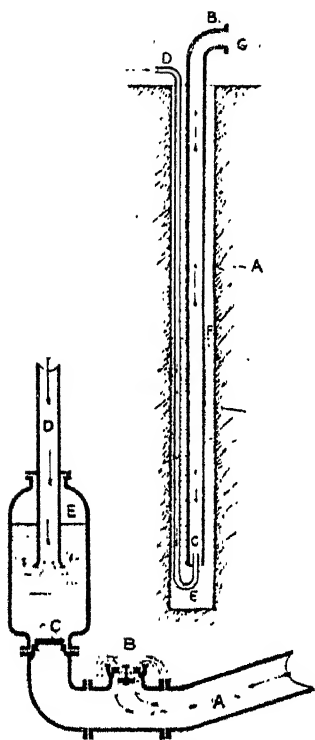


*Fig. 6. Gould's Rotary Pump.*

water-works pumps, and dredge pumps. *Rotary Pumps.*—Although the centrifugal pump has a rotary motion, it is not classed as a rotary pump. The true rotary pump is a

two rotors, which mesh like gears and turn in opposite directions. As rotation continues, the water is carried up and around to the discharge of the pump, shown at the top.

The *Hydraulic Ram* is illustrated diagrammatically in Fig. 7. The water enters the pipe A from a stream or other source, and flows out through the valve B to waste, and upon attaining a certain velocity closes this valve suddenly. The momentum left in the flowing water enables it to continue its course, and it passes on, opens the valve C, and expends its energy in lifting a portion of itself to the point of delivery, which may be a consider-



Left, Fig. 7. Hydraulic Ram.

Right, Fig. 8. Air Lift Pump.

able height up the delivery pipe D. As the effects subside the valve C closes, B opens, and water begins to flow out again to waste, until its velocity is again sufficient to close B and open C. E is an air vessel used to preserve to some extent a continuous flow and to prevent shock. These rams are very useful for small supplies, and act quite automatically.

Another method of raising water, principally from bore-holes, is that known as the *Air Lift System*, shown diagrammatically in Fig. 8. A is a boring; BC, a pipe used as the rising main, suspended in the boring, and terminating in an open end at C; DE, another

and smaller pipe, passing down the bore-hole, and turned up at its lower end into the open pipe BC. Air is forced down this pipe, and carefully regulated as to amount and pressure in such a manner as to reduce the specific gravity of the column of water BC, so that its vertical downward pressure at C is less than its upward vertical pressure due to the column of water BC, E being the level of water in the bore-hole. Under these conditions the column of water BC in the bore-hole will rather more than balance the column of water BC in the rising main, and water will consequently flow out at C, and continue to do so as long as the boring, with its water level at E, continues to supply the requisite quantity of water.

**Punch, or The London Charivari**, a famous London weekly was founded in 1841, at the inspiration of Ebenezer Landells, a London wood engraver and draughtsman. Douglas Jerrold, who till his death continued to be one of the most active members of the staff, wrote his immortal *Mrs. Caudle's Curtain Lectures* for *Punch*. In 1850 Tenniel drew his first cartoon for *Punch*, and from 1852 until 1901 he was responsible for this salient feature of the paper, one of the most striking conceptions being 'Dropping the Pilot'—i.e. Bismarck. Charles Keene, another artist whose work has helped to make *Punch* famous, joined the regular staff in 1860, and four years later George Du Maurier followed. Mr. Linley Sambourne, who succeeded Sir John Tenniel as cartoonist in chief, dates his staff connection with *Punch* from 1867. The subject of the cartoon has, since 1854, been settled at the weekly dinner of the staff, over which the editor presides. When Lemon died in 1870, Shirley Brooks succeeded to the editorship, and was himself succeeded in 1874 by Tom Taylor. Taylor held the position for six years, when Sir F. C. Burnand, whose *Happy Thoughts* had appeared in *Punch* in 1866, was called to the chair. He in turn was succeeded in 1906 by Owen Seaman, who had been assistant editor for some years. Consult Spielmann's *The History of Punch*.

**Punch and Judy**, the principal characters in a well known puppet-show. The puppets are played by putting the hand under the dress, and making the middle finger and thumb serve for the arms, while the forefinger works the head.

**Punchestown**, race-course, in Rathmore parish, County Kildare, Ireland, near Naas, well known for its April steeplechases.

**Punctuation**, the art of marking off, by

means of certain conventional signs, the divisions of a sentence in order to assist in bringing out the meaning more clearly. The usual signs employed are the period or full stop (.), the colon (:), the semi-colon (;), and the comma (,). In addition to these we have the dash (—), the mark of interrogation (?), the mark of exclamation or admiration (!), and the parentheses and brackets, ( ) [ ].

**Pundit**, a Brahman learned in Sanskrit lore and language, and in Hindu science, laws, and religion.

**Punic Wars.** See **Carthage**.

**Punishment**, a penalty exacted because of wrong doing. Reformation of the criminal and the prevention of crime represent the most modern and generally accepted methods of dealing with the subject of punishment. To that end reformatories for youthful criminals have been established, the indeterminate sentence has been adopted in many cases, as well as a system of parole.

**Punjab**, or **Panjab** ('the land of five waters'), a province of British India lying on the northwestern frontier. The area of British territory is 99,846 sq. m., and 37,059 sq. m. are under native rule. The chief agricultural products are cotton, sugar, wheat, maize, rice, and pulse; p. 20,700,000.

**Punkah**, in the Orient a large, broad fan, swung from the ceiling, and worked by an attendant, to cool a room.

**Puntarens**, town, Costa Rica. It is the only port of Costa Rica on the Pacific Coast, and is a charming old fashioned town; p. 7,848.

**Punts and Punting**. A punt is a flat-bottomed craft, without stern, keel, or stern post, and in racing punts having the width at each end at least half the greatest width. It is propelled by a pole thrust against the bottom of the lake or river. Punting is almost exclusively an English sport and is popular on the Thames River.

**Pupa**, the term applied to the quiescent stage which, in insects with complete metamorphosis, intervenes between the larval and the adult stages.

**Pupil**, of the eye, the opening, practically round, at the center of the iris, through which light enters to act upon the retina at the back.

**Pupin, Michael Idvorsky** (1858-1935), American electrical engineer and physicist was born in Idvor, Banet, Yugoslavia. He was prof. of electro-mechanics, Columbia U., 1901-31, now prof. emeritus. In 1896 he

invented a method of rapid x-ray photography and discovered secondary x-ray radiation. Probably his most famous invention is the electromagnetic loading employing the toroidal inductance coil which is universally employed in long-distance telephone transmission. He also invented electrical tuning and rectification of Hertzian waves, both universally employed. He is the author of *From Immigrant to Inventor*, an autobiography (1923); *The New Reformation* (1927); *Romance of the Machine* (1930).

**Puranas**, 'ancient traditions.' 18 songs in praise of Hindu deities—as the Brahmapurana, Bhagavatapurana, Bhavishyapurana, and so on.

**Purbeck, Isle of**, peninsular district, England. The district is famous for its marble quarries and potter's clay.

**Purcell, Henry** (1658-95), famous English musician, was born in Westminster. He early began composing anthems, other Church compositions, and songs and wrote the music for many plays. Purcell holds a very high place in English musical history. His work was characterized by inspirational and emotional qualities, by technical ingenuity, and by a certain austerity of melody. He is buried beneath the organ in Westminster Abbey.

**Purdue University**, a co-educational State institution at Lafayette, Ind., founded in 1874 under the provision of the Morrill Act of 1862, and named for John Purdue, an early benefactor. The main purpose of the institution is to train students for service in the fields of Engineering, Agriculture and Applied Science.

**Pure Food and Drug Law**, an Act of Congress, approved on June 30, 1906, and effective Jan. 1, 1907, which prohibits adulteration and misbranding and use of unwholesome preservatives in preparation of foods and drugs. The Bureau of Chemistry of the Department of Agriculture was designated in the Act as the tribunal to decide whether any specified food substance was deleterious. Dr. Harvey W. Wiley, chief chemist in the Department of Agriculture was responsible for the introduction of the act and its enforcement.

**Purgatives**, in medicine, drugs used to evacuate the bowels.

**Purgatory**, in Roman Catholic theology, a place or condition of souls intermediate between death and heaven.

**Puri**, commonly known as **Jagannath**, or **Juggernaut**, chief town of Puri district. Orissa, Bengal, India. A temple of Vishnu contains the famous idol called Jagannath—'Lord of the World,' which each year is placed



on a huge car and drawn in procession through the streets. This great car festival attracts hosts of pilgrims every year.

**Purification of the Blessed Virgin Mary, Feast of the,** a festival observed on February 2, and otherwise known as Candlemas, from the ancient custom of processioning with tapers.

**Purim**, the Jewish festival, observed on the 14th and 15th Adar, and intended to commemorate the deliverance of the Jews in Persia from the plot of Haman.

**Puritans**, a party which, though nominally taking its rise at the time when Archbishop Parker, at the request of Queen Elizabeth, formulated the constitution, articles, and ritual of the national Church of England, really owes its origin to the influence of Wycliffe and the Lollards. Already in the reign of James I. (1620) the 'Pilgrim Fathers' had taken their departure in the *Mayflower* to found in the New World a Puritan state. They established the colony of Plymouth, on the coast of Massachusetts. A few years later, in the reign of Charles I., a great wave of Puritan migration built up the colony of Massachusetts Bay, an offshoot of which was the colony of Connecticut. The distinctive doctrines and principles of Puritanism have been set forth by 'the Puritan divines,' chief among whom are Richard Sibbes, John Owen, Thomas Goodwin, Thomas Adams, John Howe, Stephen Charnock, Richard Baxter, and Matthew Henry.

**Purple**, a color that in white light emits principally red and blue rays, the red predominating; thus it varies from scarlet and crimson on the one hand to violet on the other, in the latter of which the proportion of blue rays is the larger. In the ancient world the most famous purple color was Tyrian purple, obtained from several species of *Murex* and *Purpura*. Owing to its cost, as well as its richness, it was emphatically the imperial color.

**Purpura**, in medicine, the appearance on the skin of small purple spots or patches, due to subcutaneous hæmorrhages.

**Purpura**, a genus of carnivorous gastropods, whose members, like the species of *Murex*, yield a purple dye. The Tyrian purple was extracted from species of both these genera, especially the genus *P. patula* of the eastern Mediterranean Sea.

**Purslane**, or **Portulaca**, a genus of plants belonging to the order Portulacaceæ. *P. oleracea*, the common purslane, is still cultivated as a pot-herb, the young shoots being used

in salad and the older ones for pickling.

**Purves, George Tybout** (1852-1901), American clergyman, was born in Philadelphia. From 1900 until his death he was pastor of the Fifth Avenue Presbyterian Church in New York City.

**Pus**, in surgery, the thick creamy fluid which results from suppuration, and fills abscess cavities, and is found on the surfaces of unhealthy ulcers.

**Pusey, Edward Bouverie** (1800-82), English theologian, was born at Pusey House in Berkshire. In 1835 he published his celebrated tract on *Baptism*. At that time Pusey was generally recognized as leader of the Oxford High Church movement, and a few years later the word 'Puseyism' came into vogue. On May 14, 1853, he preached the celebrated 'condemned sermon,' whose subject was 'The Holy Eucharist a Comfort to the Penitent.' The Memorial Pusey House at Oxford holds his library and perpetuates his teachings.

**Pushkin, Alexander Sergeievitch** (1799-1837), Russian poet, dramatist, novelist, and historian, was born in Moscow. He became the center of every literary circle in St. Petersburg. But he led a wild and dissolute life, and twice within three years lay at death's door from fever brought on by his recklessness. Yet in the midst of his dissipation he still had power and energy to work at *Ruslan and Lyudmila* (1817-20). Besides many smaller poems he wrote six parts of *Eugene Onegin* (utilized as the subject of an opera by Tchaikovsky) and *Boris Godunoff* (1825). He completed *Eugene Onegin*, his masterpiece, in 1832. His *History of the Pugatcheff Insurrection* (1833), *The Captain's Daughter* (1836), and *Dubrovski* (1841) are samples of Russian prose in its highest degree of perfection. Pushkin possessed an original intellect, reinforced by a quick intuition. His humor was gentle and his wit was keen; his epigrams are among the best produced in any language.

**Pustules**, in medicine, pimples or elevations of the skin containing pus, which occur in many skin diseases—eczema, acne, scabies, ecthyma, boils, etc.—and with certain of the fevers—smallpox.

**Putnam**, city, Connecticut. The 'Wolf Den' is the scene of Gen. Israel Putnam's alleged exploit with the wolf. Cargill Falls was the site of the first cotton mill in Connecticut; p. 7775.

**Putnam, Frederic Ward** (1839-1915), American anthropologist, was born in Salem,

Mass. From 1874 to 1909 he was curator of the Peabody Museum (honorary curator, 1909-13; honorary director, 1913); from 1874 to 1903 curator of anthropology, American Museum of Natural History. For his services in American archæology he was awarded the cross of the Legion of Honor by the French government in 1896.

**Putnam, George Haven** (1844-1930), American publisher and writer, was born in London. In 1866 he became a member of G. P. Putnam & Son, and in 1872 its head. He took an active interest in the subject of international copyright; was one of the reorganizers (1887) of the American Copyright League, and secretary of the league since its foundation; and was largely instrumental in the adoption of the International Copyright Law of 1891. His writings include: *Authors and Publishers* (1883); *The Question of Copyright* (1891); *Memories of a Publisher* (1915); *Some Memories of the Civil War* (1924).

**Putnam, George Palmer** (1814-72), American publisher, was born in Brunswick, Me. In 1848 he established a publishing business of his own. G. P. Putnam was the close friend of his authors, counting among them Poe, Irving, Cooper, Emerson, Carlyle, Bryant, Lowell, Bayard Taylor, and George W. Curtis; the last of whom assisted him in establishing *Putnam's Magazine*. He was a founder and honorary secretary of the New York Metropolitan Museum of Art. His published works include: *The World's Progress*; a *Dictionary of Dates*.



George P. Putnam.

**Putnam, George Palmer** (1887- ), publisher, author, was born in Rye, N. Y. He started work with G. P. Putnam's Sons, publishers, N. Y., 1909, and was later engaged

in newspaper and publicity work in Oregon. He was president of the Knickerbocker Press and treasurer, G. P. Putnam's Sons, N. Y., 1910-20. Since 1932 he has been chairman of the editorial board of Paramount Productions. Divorced in 1928, he married Amelia Earhart, 1931. Among other works, he wrote, *Andree—The Record of a Tragic Adventure* (1930) and *Wide Margins* (1942).

**Putnam, Herbert** (1861- ), American librarian, was born in New York City. His reorganization and management of the Boston Public Library led to his appointment by President McKinley, in 1899, to be librarian of Congress, a position which he held until 1939.

**Putnam, Israel** (1718-90), American Revolutionary soldier, was born on Jan. 7, 1718 (N. S.), in what is now Danvers, then a part of Salem, Mass. When Washington assumed command of the army (July, 1775), Putnam was appointed to be one of the four major-generals commissioned by the Continental Congress; and after the evacuation of Boston by the British, in March, 1776, he was sent to New York to put that city in a condition for defence. He was in command at Brooklyn Heights (Aug. 27), and the Battle of Long Island; and he conducted the American retreat through New York to the Hudson. In 1778, while in charge of the troops in Western Connecticut, he made his famous escape from Governor Tryon's dragoons by riding down the stone steps at Horseneck.

**Putnam, Mary Traill Spence (Lowell)** (1810-98), American linguist and writer, was born in Boston, the sister of James Russell Lowell. Her publications include: *Records of an Observer* (1861); *The Tragedy of Errors*, and *The Tragedy of Success*.

**Putnam, Rufus** (1738-1824), American Revolutionary soldier, was born in Sutton, Mass. When the Revolutionary War broke out he planned the defences at Roxbury and New York, and was appointed chief engineer of the American army, with the rank of colonel. With his cousin Israel Putnam he assisted in the construction of the fortifications at West Point (1779), and in 1783 was made a brigadier-general. He led the first body of settlers to the Northwest Territory, and laid out Marietta.

**Putney**, a suburb of London, England. It is a well-known rowing place, and the starting point of the Oxford and Cambridge boat races; p. 28,246.

**Putrefaction**, the decomposition that protein substances of animal or vegetable origin

undergo under the influence of the action of bacteria.

**Putting the Shot** is an athletic sport that consists in casting a weight with an upward and forward motion of the arm.

**Putty**, a plastic mixture composed of fine dry whiting or powdered chalk and linseed oil, improved by the addition of white lead.

**Putty Powder** is the dioxide of tin,  $\text{SnO}_2$ . It is used for polishing stone and glass, for making white enamel, and in making glass opaque.

**Putumayo**, an unorganized territory of approximately 200,000 sq.m., to the extreme s. of Colombia, and adjoining Ecuador.

**Puvis de Chavannes, Pierre** (1824-98), French painter, was born in Lyons. Having resolved to work out his own development and avoid all schools and cliques, he first attracted attention by two paintings, *Peace and War* (1862). He decorated the Boston (Mass.) Library with nine fine panels, *The Muses Saluting the Spirit of Enlightenment*, and representations of the *Arts and Sciences* (1895-8).

**Puya**, a genus of tropical South American herbaceous plants of the order Bromeliaceae. It equals the Agave in height, and greatly surpasses it in the thickness of its half-woody stem. When the plant is mature it thrusts forth from the crown of spiny leaves a huge showy panicle of yellow flowers, which may be from 6 to 9 ft. in height.

**Puy-de-Dôme**, a central department of France. The department is rich in minerals, coal and lead being the chief, and abounds in mineral springs, hot and cold, among which those of Mont-Dore are most widely known. Capital, Clermont-Ferrand. Area, 3,000 sq.m.; p. 490,000.

**Puy, Le, or Le Puy-en-Velay**, town and episcopal see, France, capital of the department Haute-Loire. The Romanesque Cathedral (6th-12th century) is reached by a long flight of steps, and contains a miracle-working image of the Holy Virgin in black marble. Puy is a center for the manufacture of lace and guipure; p. 22,000.

**Puzzle**, something so devised as to require ingenuity and patience in properly arranging its parts, usually for the purpose of recreation or amusement.

**PWA**, Public Works Administration. See **United States History, New Deal**.

**PWEHC**, Public Works Emergency Housing Corporation. A United States New Deal agency.

**Pyæmia, or Pyæmia**, in medicine, a septic condition of the blood in which organisms,

starting from some infected spot, possibly an external wound, enter the circulation and set up one or more abscesses elsewhere.

**Pyat, Felix** (1810-89), a French journalist and communist, was born in Vierzon, department Cher. He took a foremost part in the destruction of the Vendôme Column. His works include *Lettres d'un Proscrit* (1851).

**Pycnogonidæ, Pantopoda, or Sea Spiders**, a remarkable group of Arthropod animals, perhaps intermediate between Crustaceans and Arachnids. They are spider-like organisms, having four well-developed walking legs, often of great length.

**Pye, Henry James** (1745-1813), English poet laureate, was born in London. His works are about 20 in number, and include *Alfred* (1801).

**Pyeshkoff, A. M.** See **Gorky, Maxim**.

**Pygmalion**. (1.) In ancient legend, a king of Cyprus, who fell in love with an ivory statue of a young maiden which he himself made, and into which, by his prayers, he prevailed on Aphrodite to breathe life. He then married her, and became by her the father of Paphos. (II.) Dido's brother, who murdered her husband Sychaeus in order to possess himself of his great wealth. Consult *Æneid* 1.

**Pygmies**. See **Dwarf**.

**Pylades**, in ancient Greek legend, the son of Strophius, king of Phocis and nephew of Agamemnon.

**Pyle, Howard** (1853-1911), American illustrator and author, was born in Wilmington, Del. He wrote books for children, illustrated with his own drawings. These include: *The Merry Adventures of Robin Hood* (1883); *The Story of the Grail and the Passing of Arthur* (1910).

**Pylorus**, in anatomy, the annular opening at the lower end of the stomach, through which food passes into the bowel.

**Pylos, or Pylus**, an ancient Greek town in Messenia, on a rocky promontory at the north side of the Bay of Pylos. Nestor in the *Iliad* in king of Pylos.

**Pym, John** (1584-1643), English Parliamentary leader and statesman, was born in Brynmore, Somersetshire. At the meeting of the Long Parliament (1640) Pym proceeded to impeach Strafford and Laud, and took part in the drawing up of the Grand Remonstrance. Along with Hampden, Hollis, Haselrig, and Strode he was impeached by Charles 1.

**Pyncheon, John** (1621-1703), American colonist, was born in Springfield, Essex, England. He laid out the towns of Northampton, Hadley, Hatfield, Dursfield, Northfield,

and Westfield on lands purchased from the Indians.

**Pyncheon, William** (1590-1662). American colonist, was born in Springfield, Essex, England. He was one of the patentees to whom the charter of Massachusetts Bay was granted in 1629, and accompanied Winthrop to the new colony in 1630. He founded Springfield, after his English birthplace. In 1650, while on a visit to London, he published *The Meritorious Price of Our Redemption*, in which he opposed the Calvinistic view of the atonement and thereby brought on himself a charge of heresy in New England. An order was issued that the book should be burned by the hangman, and Pyncheon was cited to appear before the General Court; but dissatisfied with the treatment accorded him in the colony, he returned to England in 1652, settled at Wraybury, near Windsor, and conformed to the Anglican Church. He also published: *The Jewes Synagogue* (1652); *How the First Sabbath Was Ordained* (1654); *The Covenant of Nature Made with Adam* (1662).

**Pyorrhoea (Pyorrhea)** or **Riggs' Disease**, is a disease in which there is a formation of pus about the gums and sockets of the teeth, which results in loosening, and finally in the loss, of the teeth affected. It has been estimated that over 90 per cent. of all adults at some time suffer from this disease, and that over 50 per cent. of all teeth that are lost fall out through its morbid action.

**Pyramid**, in geometry, is a polyhedron, one of whose faces is a polygon and all the other faces are triangles, having the sides of the polygon as bases and having a common vertex. The pyramid is triangular, square, pentagonal, etc., according as the base is a triangle, square, pentagon, etc. The Pyramids of Egypt are quadrangular.

**Pyramids**, structures in the shape of the geometric figure so called, erected in different parts of the Old and New Worlds, the most important being the *Pyramids of Egypt*. The 'Pyramid field' lies in the Egyptian desert close to Cairo. The Great Pyramid of *Khufu* or *Cheops* (fourth dynasty) is counted as one of the seven wonders of the world. This gigantic tomb is 755 feet 8.8 inches in mean length, and 481 feet 4 inches in its original height, and the area of its base is slightly over 13 acres. Its slope or angle was 51° 50'. It has, however, been much despoiled and stripped of its exterior blocks for the building of the mosques and walls of Cairo. The original sepulchral chamber, 46 x 27 feet and 10 feet 6 inches high, was hewn in solid rock, and

was reached by a passage, 220 feet long, which descended to it from the entrance at the foot of the pyramid. According to Herodotus, this pyramid took a long time in construction—100,000 men being employed on it for 30 years. Other forms of the pyramid are located in Greece, Italy, Mexico, China, India, and Assyria.

**Pyramus**, in ancient legend, was a youth of Babylon who loved a maid Thisbe; and finding her garment befouled with blood by a lioness, concluded that she had been devoured, and slew himself under a mulberry tree, the fruit of which was ever afterwards red as blood. Thisbe, returning, saw his corpse, and killed herself upon it. See Shakespeare's *Midsummer Night's Dream*.

**Pyrenees**, mountain chain forming the boundary between France and Spain. The length of the Pyrenees proper, from Cape Cervera on the Gulf of Lions to Irun on the Bay of Biscay, is 270 m. The width of the system varies from 90 m. to about 25 at the Mediterranean extremity. The passes are usually from 6,000 to 7,000 ft. high, the highest being the Port d'Or (9,843 ft.) and Brèche de Roland (9,856 ft.). The thermal springs are very numerous and famous, those most frequented on the French side being Bagnères de Bigorre, Luchon, Barèges, and St. Sauveur; and on the Spanish side Panticos, (8,500 ft.).

**Pyrénées, Hautes.** See **Hautes Pyrénées**.

**Pyrenees, Peace of** (November, 1659), formed a sort of supplement to the peace of Westphalia (1648), and was the second great diplomatic success achieved by Mazarin, showing the supremacy of France in Europe. The chief fact of the peace was that the marriage of Louis XIV. to Maria Theresa, the infant of Spain, was arranged—a marriage that was afterwards the cause or excuse of many wars, including the War of the Spanish Succession.

**Pyrénées-Orientals**, most south-easterly dep. of France. The most important product is wine; iron is mined; the coast lagoons produce salt, and Amélie-les-Bains is noted for its sulphur springs. Perpignan is the capital. Area, 1,598 sq.m.; p. 229,979.

**Pyrenomycetes**, an order of ascomycetous fungi with flask-like fructifications, open at the top for the discharge of the spores. Some are parasitic on plants, others on insect larvæ, while several are saprophytes.

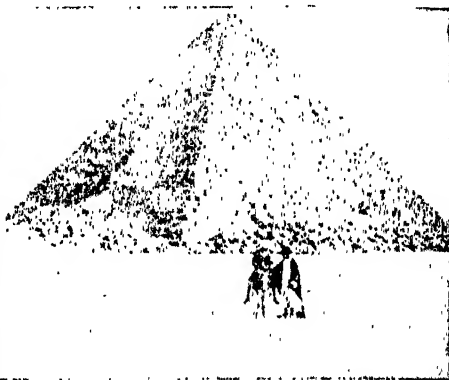
**Pyrethrum**, a section of the genus *Chrysanthemum*, herbaceous composite plants, the distinctive features of which are that the pap-

pus consists of an elevated membranous border, and the achenes are angular but not winged.

**Pyrheliometer**, an instrument devised by Pouillet to measure the heat radiated by the sun. It consisted of a thin, disc-shaped metal box containing water, to act as a calorimeter,

wintergreen family, allied to the heaths, and usually found in shady woods. The flowers are five-parted, borne in racemes on tracted scapes, and the leaves are in a tuft at the base and are often evergreen.

**Pyromania**. An insanity dependent upon hereditary or acquired constitutional condi-



*The Pyramids of Egypt*

Left, Pyramid of Cheops; Right, The Third Pyramid.

supported by an axial tube containing a thermometer.

**Pyridine**,  $C_5H_5N$ , a basic compound occurring in coal tar and in the oil obtained by the distillation of bones, from both of which substances it may be separated by distillation of the basic portion. It is the parent substance of a large number of derivatives, including some of the natural alkaloids, such as nicotine and piperidine.

**Pyrites**, strictly speaking, is disulphide of iron,  $FeS_2$ , and occurs very commonly as a brassy mineral (sp. gr. 5), crystallizing in the cubic system. Heated in air it burns, yielding sulphur dioxide gas, and leaving a residue of ferric oxide. This reaction is largely employed to prepare sulphur dioxide for the sulphuric acid industry.

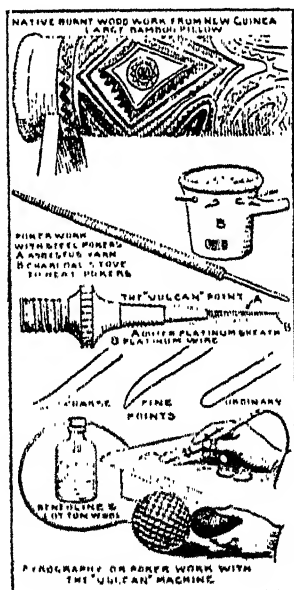
**Pyrocatechin**,  $C_6H_4(OH)_2$ , is ortho-dihydroxy-benzene. It is formed when catechin and similar bodies are distilled, and is prepared from the guaiacol,  $C_6H_4(OH)(OCH_3)$ , occurring in beech tar by heating with hydriodic acid.

**Pyrogallol**, or **Pyrogallie Acid**,  $C_6H_3(OH)_3$ , is a trihydroxy-benzene obtained by heating gallic acid.

**Pyrography** is 'the decoration of wood by partially burning or charring,' producing effects like those of dark-brown paint.

**Pyrola**. A genus of low perennials in the

tion, with periodic manifestations. It resembles dipsomania and kleptomania. At times



*Pyrography.*

the patient experiences an impulse, generally irresistible, to set fire to something, and en-

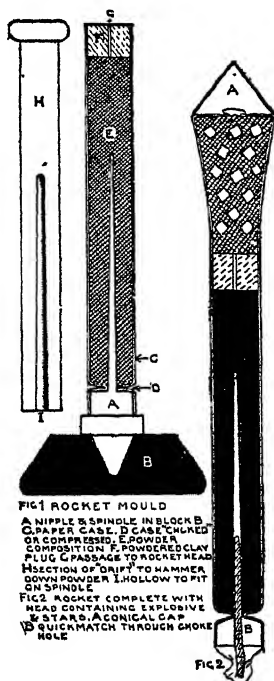
joys a feeling of relief and satisfaction when watching the flames.

**Pyrometer**, an instrument for measuring temperatures which go beyond the range of the mercurial thermometer.

**Pyrope**, or **Bohemian Garnet**, is a dark, blood-red stone found in rounded, corroded grains in basic rocks of the serpentine and peridotite groups and in the soils and sands which result from their disintegration. It is used in the manufacture of cheap jewelry under such names as Bohemian ruby, garnet, etc.

**Pyrosis**, in medicine, the vomiting or eructation of a thin watery fluid, sometimes tasteless, often bitter. It is preceded by pain or discomfort about the stomach; but the precise cause is unknown. The terms pyrosis and waterbrash are used as synonymous; but pyrosis is used particularly for *acid* eructations.

**Pyrosoma**, the phosphorescent fire-flame, a free-swimming, pelagic tunicate, remarkable for its luminosity. It is a compound form and is sac-shaped, the very numerous individuals being embedded in the wall of the sac.



Pyrotechnics.

**Pyrotechnics**, the art of making fireworks, which are almost exclusively used for the purposes of display, though to a small extent also in warfare, life-saving at sea, and drain-test-

ing. The principle on which fireworks are made is simple—by urging the combustion of a material like charcoal and sulphur, by mixing it with highly oxygenated compounds such as nitrates or chlorates, so that the action becomes brilliant or noisy. The mixtures employed do not differ fundamentally from gunpowder, though the proportions are varied to alter the rapidity of combustion; the flame is often colored by the addition of compounds like those of strontium, barium, and copper, which have well-marked lines in their flame spectra, or is made to scintillate brilliantly by the addition of filings of magnesium or iron.

**Pyroxene**. The pyroxenes are silicates with the general formula  $\text{Ca}(\text{Mg})\text{SiO}_3$ , but may contain also isomorphous admixtures of iron oxide, alumina, chromium, oxide, etc. They range in color from white to dark green and black.

**Pyroxylic**, or **Wood Spirit**, is the crude spirit obtained by distilling the volatile product of the dry distillation of wood, from which the tar has been separated and the acetic acid neutralized by lime. It is used as a solvent for making varnishes, and also to mix with ordinary alcohol to 'denature' it.

**Pyroxylin**, or **Collodion Cotton**, is a nitrated cellulose in which the nitration has not been carried so far as in gun-cotton. It is used for the preparation of collodion, celluloid, and some kinds of smokeless powders.

**Pyrrha**, in Greek mythology, the wife of Deucalion.

**Pyrrhic Dance**, the war-dance of the ancient Greeks, especially of the Lacedaemonians.

**Pyrrho**, the leader of the school of sceptical philosophy in ancient Greece called Pyrrhonism. He was a native of Elis, and a contemporary of Alexander the Great. The Sceptic philosophy admitted the reality of nothing but sensations; as to the manner and cause of sensation, it remained in a state of doubt or suspense; and so, too, with regard to all judgments of right or wrong, and noble or base.

**Pyrrhus** (318 to 272 B.C.), king of Epirus, and one of the greatest generals of the ancient world. He became master of a large part of Macedonian territory in return for aiding the king Alexander.

**Pyrrol**,  $\text{C}_4\text{H}_5\text{NH}$ , a compound of 'ring' structure, consisting of four CH groups connected by an NH group, that occurs in coal tar and bone oil, from the latter of which it can be separated.

**Pyrus**, a well-known genus of Rosaceae, with about 40 species, from northern temperate regions, including the pear, apple, and,

according to Bentham and Hooker, the quince and medlar.

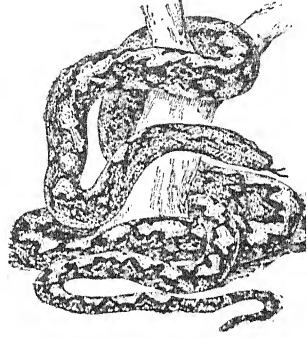
**Pythagoras**, a Greek philosopher of the 6th century B.C., who was apparently a native of Samos, and after extensive travels settled at Crotona in Italy, where he formed a society mainly of aristocrats. The chief doctrine of the Pythagorean school related to number: everything, they held, that is intelligible can be expressed numerically; without number all is chaos. The truth of the 47th proposition of the first book of Euclid is attributed to Pythagoras. In astronomy he recognized the circular focus of the earth; and his followers realized that it and the planets revolve round a central point, which they called a fire.

**Pythia**. The Pythian festival and games in ancient Greece were celebrated at Delphi, the ancient name of which was Pytho. They resembled the Olympic games in being held every four years, in the third year of each Olympiad, and in the number and character of the contests.

**Pythias**. See **Damon**.

**Python**, a genus of large, non-poisonous snakes, of wide distribution in the tropical parts of the Old World. It belongs to the family Boidæ, which includes the boa and anaconda. As in the other members of the family, vestiges of the hind limbs are present, which appear at the surface in the form of spurs near the anus. The larger Asiatic forms are capable of crushing and swallowing mammals as large as a half-grown sheep.

**Pyx**, a receptacle for holding the sacrament. It is usually a small box of silver with a base and stem, and is used when the consecrated elements are carried to the sick.



*Python (P. reticulatus).*

**Pyx, Trial of the**. This is the periodical testing of gold and silver coins issued by the British Mint to ascertain whether they come up to the legal standard of weight and fineness. The pyx is the chest or box in which the coins for trial are deposited.

**Pyxidanthera**. A charming trailing plant, native of the pine barrens of New Jersey and N. Carolina. It blooms very early in spring, its slender stems, creeping over the damp sand, crowded with small, evergreen leaves and white, waxen flowers.

**Q.** The letter is found only in the earliest of the Greek inscriptions. In the Latin alphabet it came to be employed only before *v*. In English *qu—qu—* is employed for *kw* under French influence from the 13th century ('quell'); in some words *qu* is pronounced *k* ('liquor'). The form of the letter has not varied very greatly. *Q* is the early Greek form. The Hebrew name *qôph*, in Greek *kopha*, appears to be a variation of *kaph*, Greek *kappa* (= *k*). The letter itself may be regarded as having been created by differentiation from the early Semitic *kaph*.

**Quadragesima**, an early name for the forty days' fast of Lent, and especially applied to the first Sunday in Lent—that is, the Sunday after Ash Wednesday.

**Quadrant**, a navigating instrument used for measuring angles. The quadrant contains an arc of  $45^\circ$ , but owing to its double reflection it measures  $90^\circ$ , reading from right to left.

**Quadratic Equation**, in algebra, is an equation which involves the square of the variable and generally, but not necessarily, the first power. The general type is

$$ax^2 + bx + c = 0,$$

where *a*, *b*, *c* are given constants, and *x* is the variable whose value is to be expressed in terms of *a*, *b*, *c*. The solution is

$$[-b \pm \sqrt{(b^2 - 4ac)}] / 2a,$$

giving two values, which are real if  $b^2 - 4ac$  is positive, imaginary if this quantity is negative, and coincident if it vanishes.

**Quadrature**. The finding of a square equal in area to the area bounded by any given line or set of lines straight or curved. The simplest of all curves is the circle, and consequently one of the most famous of old problems was to 'square' or find the quadrature of the circle.

**Quadrilateral**, in geometry, any four-sided figure of which the square, parallelogram, rhombus, and trapezium are particular cases.

**Quadrilateral, The**, the district between the rivers Mincio and Adige, in Northern Italy, defended by the four fortresses of Peschiera, Mantua, Verona, and Legnago. It figured prominently in the wars with Austria in the middle of the 19th century. During the

World War there was a Polish quadrilateral comprising the fortresses of Warsaw, Ivanogorod, Novogeorgievsk, and Brest-Litovsk.

**Quadrille**, a figure dance executed by an unequal number of couples drawn up in a square. It usually consists of five distinct parts or sets. The name is also given to a card game played by four persons with forty cards, the eights, nines, and tens of the ordinary pack being discarded.

**Quadroon**. See **Mulatto**.

**Quadrumania**, an order of four-handed mammals in Cuvier's system, which included lemurs, monkeys, and apes, as distinct from man, who was placed in a special order as *Bimana*, or two-handed.

**Quadruple Alliance**, a league composed of England, France, Holland and Austria, formed in 1718 to counteract the schemes of Spain and enforce the terms of the Treaty of Utrecht (1713). A second alliance was formed in 1815 between Russia, Austria, Prussia, and Great Britain to support the Bourbons in France, to the perpetual exclusion of Napoleon, and was again brought into power in 1840 to help the Sultan against Mehemet Ali, who had conquered Syria as well as Egypt.

**Quæstor**, a magistrate in ancient Rome.

**Quagga**, or **Couagga** (*Equus quagga*), a horse-like animal of Africa. In color it forms a link between the zebras and the asses, but differs from the asses in having short ears, and in the arrangement of the hairs on the tail, which recalls that of the horse. The general body color is reddish brown.

**Quai D'Orsay**, a part of the left bank of the Seine, Paris, on which is situated the Chamber of Deputies. Hence it has come to denote the French government in the same way that Downing Street denotes the English.

**Quail**, the name of a large variety of small game-birds, represented all over the warmer parts of the world, and closely related to the partridges. All the American species fall into a group separate from those of the Old World whose name they have borrowed, distinguished as *Odontophorinae*, and characterized by having the beak notched or two-toothed on the max-



gins, and the absence of spurs. The best known is the widely distributed bobwhite (*Colinus virginianus*), which is found from Main and Ontario w. to the dry plains and s. to the Gulf Coast.

**Quain, Jones** (1796-1865), Irish anatomist, was born in Ratheahy, County Cork. He published *Elements of Descriptive and Practical Anatomy* (1828), a work well known to all medical students, and a translation of Martinet's *Manual of Pathology*.

**Quain, Richard** (1800-87), Irish anatomist and surgeon, brother of Jones, was born in Fermoy, County Cork. His published works include *Diseases of the Rectum* (1854), and *Anatomy of the Arteries of the Human Body* (1844).

**Quain, Sir Richard** (1816-98), Irish physician, was born in Mallow, County Cork. In 1891 he became president of the British Medical Council, and though a leading consulting physician, he edited the *Dictionary of Medicine* (3d ed. 1902).

**Quakers.** See **Friends, Society of.**

**Qualities, Primary and Secondary**, in philosophy, signify respectively the mathematical qualities of material bodies, such as size and shape, and their other qualities, such as color and smell.

**Quantum Theory.** In 1900 Professor Max Planck of the University of Berlin published a theoretical paper which is regarded as marking the creation of the quantum theory. To obtain agreement with experiment he made the bold assumption that there are oscillators in the atoms and molecules of bodies which emit and absorb radiant energy, not of all magnitudes, but only in whole multiples of an element of energy which he assumed to be equal to a constant, called  $h$ , multiplied by the natural frequency,  $\nu$ , of the oscillator. This hypothesis together with the laws of statistical mechanics gave a radiation formula which agreed with the experimental data within the error of observation. It may truly be said that Planck for the first time atomized energy as Dalton a century ago had atomized matter.

The deduction of the radiation formula did not exhaust the possibilities of the above revolutionary hypothesis. It was observed by Hertz, Righi and others that a body, carefully insulated and initially uncharged, acquired a positive charge when exposed to radiations containing wave-lengths smaller than a certain value. The acquisition of the positive charge is due to the emission of electrons and the maximum value of the effective wave-length depends on the material of the body exposed.

This phenomenon is known as the photoelectric effect. Lenard discovered that the speed of the emitted electrons is independent of the intensity of the incident radiation, in other words the brightest light from the most powerful searchlight in the laboratory removes an electron with exactly the same speed as the weakest light from the most distant star. Einstein using the quantum theory showed that these observations could be explained by making the assumption that the kinetic energy of the emitted electron is equal to the quantum of incident radiation minus the work necessary to remove the electron from the surface of the body.

Another of the most striking successes of the quantum theory occurs in Bohr's explanation of the origin of the lines in the spectrum of gases. He employed Rutherford's idea of the structure of the atom and assumed that the electrons revolving about the nucleus could only move in certain orbits and in each orbit an electron has a definite amount of energy. An electron in jumping from one orbit to another orbit of greater or less energy then absorbs or emits radiation of a frequency as given by the quantum hypothesis.

The quantum theory also offers a satisfactory explanation of atomic heat. The atomic heat, at constant volume, of a substance is defined as the amount of heat which must be communicated to a gramme-atom of a body in order that its temperature may be raised one degree. According to classical mechanics this quantity of heat should be a constant for all monatomic bodies and be independent of temperature. While this law is approximately true for many substances at ordinary temperatures it is far from the truth for other substances and especially at low temperature. Einstein was again the first to successfully apply the quantum theory to this problem and he showed that the classical value of atomic heat is true only for atomic vibrations of low values and at relatively high temperatures.

**Quarantine**, originally, the period during which a ship suspected of having an infectious disease on board was obliged to wait before having intercourse with the shore. The usual period was forty days, whence the term *quarantina*; but longer and shorter periods were allowed, as circumstances required. Under the provisions of a code, adopted in 1850, a ship secures a 'foul' or a 'clean' bill on leaving a port, according to the condition of the port regarding the presence of infectious disease. It is the duty of the officers of customs, when they first board a ship on her arrival, to ascertain



Stone Quarry near Charlottesville, Virginia.

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whether any one on board is or has been during the voyage ill with an infectious disease. Those ships which have not a clean bill are at once put into quarantine for varying lengths of time until all necessary precautions have been taken. In the United States, besides the national there are State regulations for quarantine. The health officers of the ports in the seaboard cities are endowed with broad powers by the State, and have nearly absolute control of incoming vessels and of their passengers.

**Quarry and Quarrying**, the removal of stone from its natural environment. When the material is to be employed in building, it is usually cut from the rock as near its required size as possible. When the stone is required for road metal or for the limekiln, the easiest and least expensive methods may be employed. The methods used are by hand tools, by explosives, and by channeling and wedging. The explosive formerly used was gunpowder; but now some mixture containing gun cotton or nitroglycerine is much in favor. Before the blocks leave the quarry they are roughly dressed to the required sizes. See MINING; BUILDING STONE; MARBLE.

**Quart**, a measure of capacity, used in Great Britain and the United States. The U. S. liquid quart, the fourth part of a gallon, contains 57.750 cubic inches, while the dry quart, the thirty-second part of a bushel, contains 67.2006 cubic inches. See WEIGHTS AND MEASURES.

**Quarter Days**, days on which, by law or custom, rents and other quarterly payments fall due.

**Quarter-deck**, originally a smaller deck situated above the half-deck. It now denotes that part of the upper deck which extends from the mainmast or gangway amidships to the poop.

**Quartering**, in heraldry. See **Heraldry**.

**Quartermaster**, an army officer whose duty is to provide quarters, provisions, storage, clothing, fuel, stationery and transportation for a regiment or other body of troops and to superintend the supplies. In the navy a quartermaster is a petty officer who assists in the steering of the ship.

**Quartermaster Corps**, a department of the U. S. Army, created by act of Aug. 24, 1912, by the consolidation of the former Quartermaster's Department, Subsistence Department, and Pay Department. Its principal duties are the purchase and procurement for the Army of all supplies of standard manufacture; the handling of all cemetery matters; direction of all work pertaining to the con-

struction, maintenance, and repair of buildings connected with the Army; storage and issue of supplies; operation of utilities; transportation of the Army by land and water; and such other duties as the Secretary of War may prescribe.

**Quarterstaff**, a strong iron tipped pole about eight feet long and an inch and a half in diameter, formerly much used as a weapon by English peasants.

**Quartet**, a piece of music arranged for four solo voices or instruments, no one of which can be omitted without destroying the proper effect of the composition. They originated with Haydn, and were further developed by Mozart, and notably by Beethoven, who perfected the art of part-writing.

**Quartier Latin**, or **Latin Quarter**, the student quarter of Paris.

**Quartz**, a mineral composed of silica,  $\text{SiO}_2$  (see **SILICON**), forms the principal ingredient of sandstone, and occurs also in clays, granites, porphyries, and in most other rocks, besides forming veins or reefs which may be rich in gold or other metals. It is very resistant to weathering and hence is usually smooth and glassy in appearance. It occurs both in crystals and massive. It is the hardest of the common minerals, scratches glass easily, and becomes positively electrical by friction. It has also the peculiar property of rotating the plane of polarized light in a direction parallel to the long axes of the crystals (see **POLARIZATION OF LIGHT**).

The varieties of quartz are numerous, and their uses varied. Pure transparent colorless quartz, known as Rock Crystal, is used for spectacles and prisms. Less pure varieties, colored by the impurities present, are used in jewelry. They include amethyst; cairngorm morion, and citrine; rose quartz; occidental emerald and sapphire; occidental cat's-eye, etc. Lamps of fused quartz are especially valuable in the therapeutic application of light.

**Quartzite**, or quartz rock, is a white, gray, or yellowish rock, composed principally of quartz, with often a small amount of feldspar, mica, chlorite, iron oxides, and other minerals. It may be recognized by its great hardness; smooth, shining, lustrous surface; resistance to acids and to weathering; and its sharp-edged splintery fracture.

**Quasi Contracts**, a term now commonly employed to denote a class of obligations imposed by law, which are also generally known as 'contracts implied in law.' They differ from true contracts in that a true contract is based upon consent, either actual or implied, while a quasi contract or contract implied in law is

created or imposed independently of the ascent of the party bound.

**Quasimodo**, the first Sunday after Easter, so called from the introit *Quasi modo geniti infantes* ('As new-born babes').

**Quass**, or **Kvass**, a thick, muddy rye and oats beer made in Russia.

**Quassia**, a genus of tropical American trees belonging to the order Simarubaceæ. The wood is exceedingly bitter, and was formerly much employed in medicine.

**Quaternary**, that epoch of the earth's history which follows the Tertiary and embraces the Pleistocene, or Glacial, and the Recent, or Postglacial, period.

**Quaternions**, a mathematical method invented by Sir William Rowan Hamilton of Dublin. It is essentially a method of vector analysis. (See VECTOR.) There are two distinct ways of establishing its principles. It may be considered as a system of complex numbers, with one ordinary unit and three extraordinary or imaginaries. But the calculus may be established geometrically and dynamically on quite a different basis; and it is this aspect which gives it value as an instrument of physical research. A systematic development of quaternions along either of the lines indicated leads to important geometrical and dynamical meanings which may be attached to the quaternion symbolism.

**Quatrain**, a term usually applied to a poem of one stanza of four lines which rhyme alternately.

**Quatre-Bras**, village, Brabant province, Belgium; 19 m. s.e. of Brussels. It was the scene of the British victory over the French on June 16, 1815, at which the Duke of Brunswick was slain.

**Quatrefoil**, in architecture, an ornament representing a four-leaved or cruciform flower, a feature characteristic of the Gothic style.

**Quay**, a loading and unloading dock for vessels, built of masonry, as distinguished from a wharf built of wood. See DOCKS.

**Quebec**, a province of the Dominion of Canada, lying between Ontario and Labrador. It is bounded on the e. by Labrador and the Gulf of St. Lawrence; on the s. by New Brunswick, Maine, New Hampshire, Vermont, and New York; and on the n. and w. by Hudson Strait and Hudson Bay. Quebec includes Anticosti Island (2,500 sq. m.), the Bird, and the Magdalen Islands. The extreme length of the province from n. to s. is about 2,000 m.; width, from e. to w., 1,350 m. Area, 594,534 sq. m.

The Laurentides on the n., 30 to 60 m. n. of

Montreal and Quebec, are part of a great ancient range that extends continuously from Lake Superior to Labrador. This part of the province is a high plateau, densely wooded, except in the extreme n., and abounds in lakes and rivers which form a system of waterways in every direction. The valley of the St. Lawrence extends from the city of Quebec, or a little below it, to the western boundary of the province. It is bounded on the n. by the Laurentian plateau, and on the s. by the Notre Dame Mountains, a continuation of the Green Mountains of New Hampshire and Vermont. A projection of this mountainous range forms the Gaspé peninsula. The St. Lawrence River flows the length of the province. It is navigable 520 m. to Montreal for ocean vessels of 15,000 tons, making this city the great commercial centre of Canada. The Ottawa River from Lake Timiskaming is its largest tributary. The famous Falls of Montmorency, near Quebec, are 250 ft. high. The Saguenay River, flowing from Lake St. John (area, 360 sq. m.), is one of the most remarkable rivers in the province.

The climate is bracing and very healthful. The winters are rigorous; but the air is dry. The soil is generally rich and well adapted to the growth of ordinary field crops, fruit, etc. This is particularly true of the Valley of the St. Lawrence and the Eastern Townships. In the latter is found some of the best farming and grazing land in the Dominion. It is unlikely that the Laurentian region will ever maintain a numerous population, as it is not adapted to successful agriculture.

The northern part of Quebec is underlain by the Laurentian system, which is composed of pre-Cambrian gneisses, schists, granites, crystalline dolomites, and various other metamorphic and igneous types. This northern region belongs to a very ancient continental area, perhaps the oldest in the world. Farther south the Laurentian region is succeeded by sandstones. A large part of the country is covered with Pleistocene deposits of the Glacial age.

Among the more common trees of Quebec indigenous in the province are the pine, spruce, hemlock, maple, beech, birch, and basswood. Moose, caribou, and deer are found in abundance in the thinly settled districts and in the backwoods. Along the St. Lawrence are localities well known as the resorts of wild swans, geese and ducks, and sea fowl of many varieties; while the forests everywhere contain partridge. The large area of unsettled country will provide abundant game for many

years to come. The trapper still earns a sufficient livelihood from the pelts of even the ordinary fur-bearing animals.

The forest area is vast and Quebec easily takes first place among the provinces of the Dominion in the number of pulp and paper mills and the value of their output. No American region is more famous for its inland fishing. It is the sportsman's paradise. Trout, salmon, bass, pickerel, sturgeon, and whitefish are abundant. Along the coast are valuable her-



*Quebec, Winter Sports.*

ring, cod, mackerel, and lobster fisheries. Next to its forests, mines, and water powers, the inland and sea fisheries of the province constitute one of its most important natural resources. Products of the mine are not so numerous or valuable in Quebec as in the neighboring province of Ontario. The most important of the minerals is asbestos, and the production of cement is an important industry.

The land in the St. Lawrence Valley and the Eastern Townships is excellently adapted to the cultivation of wheat, oats, and the usual fodder and root crops. The Eastern Townships, in particular, are noted for their agricultural products, and for the quality and quantity of their butter and cheese. Apples

and other fruits are grown near Montreal and in the Eastern Townships. Potato growing is an important branch of agriculture, and tobacco also is grown in the province. French-Canadian cattle, the original stock of which was imported from France in 1625, closely resemble certain breeds still found in Normandy. Horses and sheep are also raised.

The St. Lawrence River forms a navigable highway as far up the river as Montreal. Other important waterways are the Ottawa and Richelieu Rivers, which provide access to the city of Ottawa and to Lake Champlain and the canals of New York State. The chief manufactured products of the province are pulp and paper, electric light and power, railway rolling stock, cotton, cigars and cigarettes, butter and cheese, ready-made clothing, flour, and boots and shoes. Montreal is the most important manufacturing centre. The chief articles exported are wheat and other grains, lumber, paper, pulp, living animals and meats, cheese, butter, and milk. The population of the province is 3,170,000. Quebec, the capital, has a population of 130,304, and Montreal, the largest city, has 818,577 inhabitants. The school system of Quebec is controlled by a Superintendent of Education, assisted by a council which is divided into two committees each under a deputy head for the management of Protestant and Roman Catholic schools, respectively. Higher education is represented by Laval University at Quebec, Montreal and McGill Universities at Montreal, and the University of Bishop's College at Lennoxville. In religion the large majority of the population is Roman Catholic. The affairs of the province are administered by a lieutenant governor appointed by the Dominion government, who is advised by an Executive Council of 11 members responsible to the Legislative Assembly. The latter is composed of 99 members, elected by what is virtually manhood suffrage. There is also an upper house, called the Legislative Council, composed of 24 members, who are appointed for life by the lieutenant governor in Council.

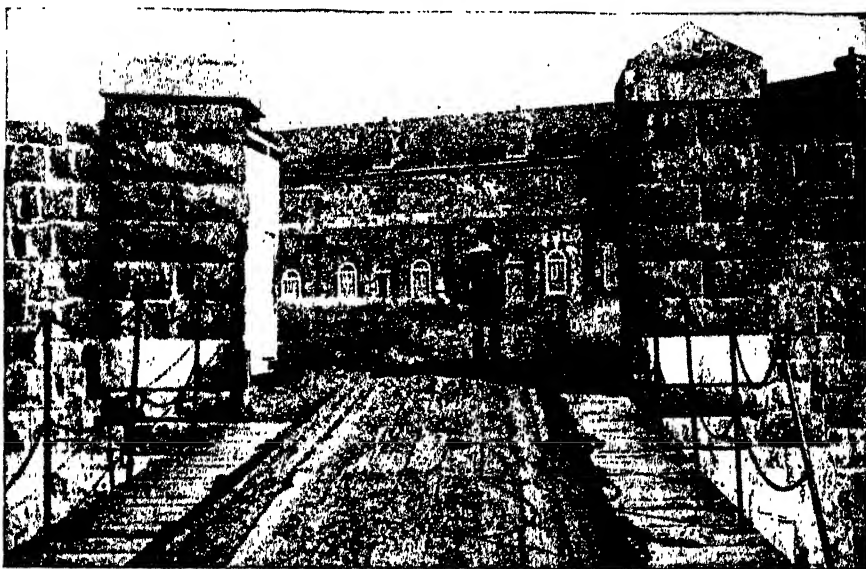
The history of Quebec from 1535, when Jacques Cartier sailed up the St. Lawrence, to the English conquest in 1759, relates the attempt of France to found a Catholic empire in America. In 1608 Champlain founded the city of Quebec, established trading posts, and explored the St. Lawrence and Ottawa Rivers and the Great Lake region as far as Georgian Bay. The missionaries sent out by the Recollet and Jesuit orders, respectively, in 1615 and 1635 aided heroically in the upbuilding of the

colony; but attacks by the Iroquois and the grasping monopoly of trade enjoyed by the company of the Hundred Associates made progress difficult. Montreal was founded by Maisonneuve in 1642. The power of the Roman Catholic Church was established firmly under Monseigneur de Laval, who arrived at Quebec in 1650, and in 1674 became the first bishop of Canada.

The career of the great Frontenac (1672-98) infused new life into the colony. The struggle between France and England culminated in the Battle of the Plains of Abraham in 1759;

*of France in the New World; Sulte and Fryer's History of Quebec.*

**Quebec**, city, Canada, capital of the province of Quebec, is situated on the left bank of the St. Lawrence River, at the mouth of the St. Charles River, 173 m. n.e. of Montreal. Picturesquely situated in a region of rare natural beauty, once the centre of French colonial commerce and civilization, and long a leading city in the New World, Quebec is one of the most interesting cities in America. Cape Diamond, the highest part of its site, reaches an elevation of 333 ft. above the river, to which



© Publishers Photo Service.

*Old Fort at Point Levis, Quebec, on the site of one of General Wolfe's Batteries.*

and in 1763 Canada was ceded to England by the Treaty of Paris. About one fourth of the French population of 60,000 in 1763 was contained in Quebec, Montreal, and Three Rivers. By the Quebec Act of 1774 England granted an appointive council to govern the province; but this stirred up opposition among the small English-speaking minority, who wanted representative institutions; and the Constitutional Act of 1791 divided the province into Lower and Upper Canada. During 1841-67 Lower and Upper Canada were under a legislative union; but this ended in political deadlock on account of racial antagonism. The result was confederation in 1867, in which Quebec was satisfied by the grant of control of provincial affairs. See CANADA.

*Bibliography.*—Consult Parkman's *Pioneers*

it presents a precipitous front. The Citadel of 40 acres, with bastions and parapets, is upon the summit, which commands one of the finest views in the world. About the citadel—the strongest natural fortress in America—is the Upper Town, with the chief residences, public buildings, churches, gardens, and retail shops. The Lower Town, built round the foot of Cape Diamond, is the commercial section. Warehouses and wharves line the banks of both rivers. Outside the walls, which enclose the Upper Town, and behind the latter, are the Houses of Parliament and the Plains of Abraham, with a monument to Generals Wolfe and Montcalm. Quebec's crooked streets, its battlements, fortresses, castles, monasteries, convents, and feudal gates and walls, suggest a mediaeval city of Europe. Laval University,

chartered by Queen Victoria and Pope Pius ix., is the largest and most influential Catholic institution of higher education in Canada.

Quebec is an important port, and is connected by steamship with European and other seaports. All the ocean steamships to and from Montreal call at Quebec; and the largest boats, in order to escape the dangers of river navigation above Quebec, make this city their terminus. The chief export is lumber, formerly rafted into coves along the St. Lawrence, but now carried by rail. The city has also a large foreign trade in grain and cattle. Industrial establishments include boot and shoe factories, tanneries, machine shops, boiler shops and other steel and iron plants, printing and binding plants. The Quebec bridge, which spans the St. Lawrence 7 m. above the city, is of the cantilever type and is notable for having the longest span of any bridge yet built - 1,800 ft. The population of Quebec is 130,504.

The history of Quebec is not surpassed in interest by that of any other city in America. Jacques Cartier sailed up the St. Lawrence in 1535, and found the Indian village of Stadacona. Here, in 1608, Champlain founded a settlement, which he named Quebec. The English captured it in 1629, but it was restored to France in 1632. In 1663 it became the capital of the royal province of New France. In the contest between England and France for the New World, Quebec was the scene of memorable conflicts. After an unsuccessful attempt made by Phipps to capture the city in 1690, and the abortive expedition of Walker in 1711, the British under General Wolfe were victorious (1759) in the battle on the Plains of Abraham. (See WOLFE; MONTCALM; ABRAHAM, HEIGHTS OF.)

In 1763, Quebec, with the whole of Canada, was ceded to England by the Treaty of Paris. An attempt of the Americans to take Quebec ended in disastrous defeat and in the death of their leader General Montgomery, on Dec. 31, 1775. Benedict Arnold bore a prominent part in this expedition.

**Quebec Act**, an act of the British Parliament (1774) providing for the government of Lower Canada, which had been ceded by France as a result of the French and Indian War. In order to prevent the inhabitants from joining the Thirteen Colonies in their demands for independence, the boundaries of the province were extended to include all land n. of the Ohio and e. of the Mississippi River, later known as the Northwest Territory.

**Quebracho**, the name given to several trees indigenous to South America. Red Que-

bracho (*Lawsonia brea*) is a large tree forming enormous forests in Brazil and Argentine. Its heartwood contains from 20 to 25 per cent. of tannin. It is one of the hardest known woods and its bark contains aspidospermine, used in asthma and croup.

**Queen**, the official and social title of the wife of a reigning king, in which case the title may be extended to 'queen consort.' The widow of a deceased sovereign is called the 'queen dowager'; or if her son is the reigning sovereign, she is the 'queen mother.'

**Queen Anne's Bounty**, a perpetual fund established by Queen Anne of England to increase the scanty livings of the clergy in the poorer English parishes. The bounty is now administered by a board of governors, and the fund amounts to upward of \$35,000,000.

**Queen Anne's War** (1702-14). In American history the name applied to the extension in America of the War of the Spanish Succession. On the morning of March 1, 1704, a party of French and Indians under Hertel de Rouville attacked Deerfield, Mass. About 50 persons were killed, 137 escaped, and 111 were taken prisoners to Canada. In August, 1708, an attack was made on Haverhill, Mass., with a similar result.

Meanwhile counter expeditions made against Port Royal in 1704 and 1707 failed. In 1709 an extensive expedition against Canada was planned, but the expected aid from England was delayed, and the expedition failed. The next year six British vessels, together with thirty from New England, filled with colonial troops, took Port Royal, which was renamed Annapolis. On July 30, 1711, fifteen British vessels and more than forty colonial vessels with colonial troops in all about 12,000 men left Boston. Eight vessels with about 1,000 men were lost in the St. Lawrence River (Aug. 22); and in spite of entreaties, the commander, Sir Hovenden Walker, turned back, necessitating the retreat of the expedition which was proceeding from New York.

The War of the Spanish Succession was ended by the Treaty of Utrecht in 1713; but the border warfare continued nearly a year longer. By the treaty the French gave up Acadia, the country around Hudson Bay, and all claims to Newfoundland, though reserving the right to land for drying fish. Cape Breton was retained.

**Queen Charlotte Islands**, a group off the coast of British Columbia, Canada. They were discovered in 1778 by Captain Cook, and annexed to the British empire in 1787. Timber is abundant, and the fisheries are very pro-

ductive. Little settlement has taken place; p. under 700.

**Queen Charlotte Sound**, on the western coast of British Columbia, Canada, separates Vancouver Island from the mainland.

**Queen Conch**, the name in Florida and the British West Indies for the large helmet shell (*Cassia cameo*) which is most used for cutting cameos.

**Queen-Consort**. In Great Britain the wife of the king regnant is in all respects subject to the ordinary laws which affect other subjects.

**Queen Fish**, a small fish (*Sciphus politus*) of the drumfish family (*Scianidae*), numerous along the sandy coast of Southern California, and highly esteemed as a food.

**Queen of the Meadow**, a popular name for *Spiraea ulmaria*. See MEADOW SWEET.

**Queens**, one of the boroughs of the city of New York. It includes the former Long Island City and the former towns of Jamaica, Flushing, and Newtown, with districts previously included in the towns of Hempstead, Far Rockaway, and Rockaway Beach. It became a borough on Jan. 1, 1898. It covers an area of 117.39 sq. m., and has 993 acres of public parks. It is connected with Manhattan at Fifty-ninth Street by the Queensboro bridge; p. 1,297,634. See NEW YORK CITY.

**Queensberry, Earls of**. The title Earl of Queensberry was bestowed in 1633 by Charles I. on Sir William Douglas (d. 1640) of Drumlanrig, Dumfriesshire, descended from Sir William Douglas, a natural son of James, second Earl of Douglas, slain at Otterburn.

**Queensberry, John Sholto Douglas, Eighth Marquis of** (1844-1900), English sportsman, was an authority on the prize ring, and the author of the 'Queensberry Rules' of boxing.

**Queensbury, or Queenshead**, urban district and town, West Riding, Yorkshire, England; 4 m. n. of Halifax. It has stone quarries and coal mines, and shares in the manufacturing industries of Halifax; p. 6,125.

**Queenscliff**, watering place, Victoria, Australia, at entrance to Port Philip; 32 m. s.w. of Melbourne; p. 2,000.

**Queen's Counsel**. See **King's Counsel**.

**Queen's County**, inland county, Leinster province, Ireland. There are several ancient remains. Agriculture and dairying are the chief industries. Area, 664 sq. m.; p. 51,540.

**Queensland**, the northeast state of the Commonwealth of Australia. Queensland is separated into two areas by the Dividing Range, which follows the coast line at from 10

to 300 m. The country between the Dividing Range and the coast consists of alluvial areas and fertile river valleys. West of the Range the country is smooth, rolling downs, covered with rich pasture. Queensland is rich in minerals. Gold, silver, lead, tin, and copper are found in the eastern slopes, and opal in the interior. The climate during the winter months is mild, and is likened to that of Madeira; the summer months are hot. The average yearly rainfall is about 60 inches on the southern seaboard. In the tropical regions of the n. the rainfall is heavy. The interior plains fatten stock; the rich soils of the coast belt grow sugar, coffee, and fruits; and on the Darling Downs cereals flourish and dairying is successful. The most pronounced vegetable type is the eucalyptus, which furnishes excellent hard woods. Next in importance to mining comes the pastoral industry—wool, frozen meat, tallow, butter, hides, and skins. Other industries include pearl fisheries at Thursday Island, fruit and sugar production, distilleries, viticulture, tanning, printing, and boat-building. The chief cities are Brisbane, the capital, Maryborough, Bundaberg, Gladstone, and Rockhampton. The administration consists of the governor, appointed by the crown, and an executive council. There is one House of Parliament, the Legislative Assembly, an elective body of 72 members. Equal suffrage prevails. The coast of Queensland was visited by Captain Cook in 1770, but the first settlement was a British penal colony in 1825. The territory (Moreton Bay District) was opened to free settlement in 1842. In 1859 it was set off from New South Wales as the Queenstown colony, and in 1901, with the other colonies, it formed the new Commonwealth of Australia; p. 1,016,000.

**Queenston**, village, Ontario, Canada; 6 m. n. of Niagara Falls. The Americans occupied the heights during the night of Oct. 12, 1812, but the place was retaken by the British the next day. A monument 185 ft. in height commemorates the victory of General Brock, the British leader; p. about 200.

**Queenstown**, now **Cobh**, seaport, Irish Free State, in County Cork, on the south side of Great Island in Cork Harbor. It is a port of call for United States mail steamers; p. 8,000.

**Quelpaert**, or **Tamara**, island, s.w. of Korea, about 40 m. long, and 10 to 20 m. broad; p. about 100,000.

**Quercia, Jacopo della** (1374-1438), Italian sculptor, was born in Quercia, near Siena. He was one of the first to show that a near approach to nature is possible in sculpture.



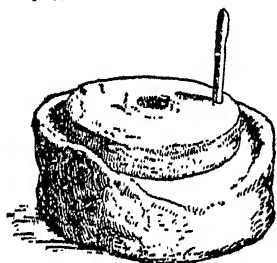
His skill is best seen in the chief door of San Petronio, Bologna, and the marble fountain in the piazza of Siena.

**Quercitron**, a dyestuff obtained from the inner bark of the black oak (*Quercus velutina*).

**Quercus**, a genus of trees and shrubs belonging to the order Cupuliferae. See OAK.

**Queretaro**, town, Mexico, capital of the State of Queretaro, on an elevated plateau; 135 m. n.w. of Mexico City. It is a quaint old city, famous for its opals. Cotton manufacture is the leading industry. Queretaro is one of the most historic towns of the republic. The movement for independence began here, and here also Emperor Maximilian was besieged by Juarez, taken prisoner, and shot in 1867; p. 30,000.

**Quern**, a stone handmill for grinding grain, once commonly used in the British Isles, but now practically obsolete. The upper stone, which has a hole in the centre through which the grain is dropped, is made to revolve by means of a peg or handle.



*Syrian Quern, as used at the Present Day.*

**Quesnay, François** (1694-1774), French physician and economist was born in Mérey. The founder of the economic school of the physiocrats, his theories are formulated in his articles 'Fermiers' and 'Grains' in Diderot's *Encyclopédie* (1756-7) and in *Tableau économique* (1758).

**Quételet, Lambert Adolphe Jacques** (1796-1874), Belgian statistician and astronomer, was born in Ghent. In 1826 he was appointed to superintend the erection of the Brussels Observatory, which was constructed according to his plans and of which he became director. He is, however, best known as a statistician.

**Quetta**, locally known as **Shalkot**, chief town of Quetta district, British Baluchistan; 20 m. n.w. of Bolan Pass. It is over 5,000 ft. above sea-level, strongly fortified, and is the headquarters of the British residents of Baluchistan; p. 25,000.

**Quetzalcoatl**, a god of the ancient Mexicans, worshipped, especially at Cholula, as the god of the air and rain.

**Quevedo y Villegas, Francisco Gomez** (1580-1645), Spanish poet and satirist, was born in Madrid. His picturesque tale, *El Buscon*, and his fantastic philosophical essays, called *Las Visiones*, are classics known throughout the world.

**Quezal** (*Pharomacrus mexicanus*), a beautiful bird, member of the trogon family, native to Guatemala. Its gorgeous plumes were formerly a prerogative of the chiefs, and it now serves as the national symbol of Guatemala.

**Quezaltenango**, town, Central America, in Guatemala; 75 m. n.w. of Guatemala City. An earthquake in 1902 practically ruined the city and destroyed many fine coffee plantations; p. 30,125.

**Quezon, Manuel Luis** (1878-1944), Filipino lawyer and political leader; a revolutionist under Aguinaldo, he was resident commissioner to the U. S., 1909-16. He later became president of the Philippine senate and supporter of the law, 1934, providing for the 10 year commonwealth under U. S. jurisdiction to be followed by Philippine independence. Quezon was elected President of the commonwealth in 1935, for a six year term. He made a dramatic escape from Corregidor after its capture by the Japanese and came to the United States May 6, 1942.

**Quiché**. See **Maya-Quiché**.

**Quichuas**, or **Quechuas**, a civilized people of South America, formerly dominant in Peru, where they still form the great majority of the population. There were six main branches. Quichuan is a highly polysynthetic stock language, rich, sonorous, and flexible, with a copious oral literature.

**Quicksand**, sand which is mixed with water to such an extent that it forms a pulpy mass, unable to support the weight of men or animals. It is usually very fine, and is mixed with clay or calcium carbonate, which enables it to retain moisture.

**Quicksilver**. See **Mercury**.

**Quidor, John** (1800-81), American figure painter, was born in Gloucester co., N. J. Four of his large paintings, illustrating the *Knickerbocker History of New York* by Washington Irving whose friend he was, are now in the art gallery of the Brooklyn Museum.

**Quids**, in United States history, a title applied, 1805-11, to a small faction of the Republican party hostile to Jefferson and Madison.

**Quietism**, a form of mysticism which finds

the essence of religion in the quiet, passive contemplation of the Divine. The name Quietism seems to have been first applied to the tenets of the Spaniard, Molinos, whose *Spiritual Guide* influenced François de la Combe, the instructor of Madame Guyon, whose quietistic views gained many adherents in Switzerland, Savoy, and Piedmont. The Quietists were orthodox Catholics but felt no need for the mediation of the church after they had attained a perfect communion with God.

**Quills**, in popular language, the large feathers from the wings of birds that were formerly cut into writing-pens. Strictly speaking, the quill is the lower hollow portion of such large feathers.

**Quimper**, town, France, capital of the department of Finistère; 33 m. s.e. of Brest. It is a typical Breton fishing town, with a Gothic cathedral. The town is famous for its pottery made in Læmaria, a suburb; p. 21,000.

**Quince** (*Cydonia vulgaris*), a fruit, native to North Persia and Anatolia, now as widely grown as apples, and under like climatic conditions. It is a harsh acid fruit, of little value as an edible fruit but excellent for canning.

**Quincy**, city, Massachusetts, Norfolk co., 8½ m. s.e. of Boston. Quincy is one of the oldest towns of the State and is filled with objects of historic interest. The First Congregational Church is the resting place of the remains of John Adams and John Quincy Adams, natives of Quincy, at that time included in Braintree. The house in which the former was born, built in 1681, is still standing, as well as the birthplace of the latter, erected in 1761. A bronze tablet on Adams Academy marks the site of the house in which John Hancock was born. The industries include the quarrying and manufacturing of the famous Quincy granite, and ship-building at the Fore River Yards.

The first settlement here was made in 1625. The place was known as Mount Wollaston, but formed part of Braintree, until incorporated as a town in 1792. It was named for Colonel John Quincy. It was the scene, in its early days, of the merrymaking and other activities of Thomas Morton, which gave such scandal to the people of the Massachusetts Bay and Plymouth colonies; p. 75,810.

**Quincy, Edmund** (1808-77), American author, a son of Josiah Quincy (1772-1864). He became an ardent abolitionist. Among his works are *Wensley, a Story without a Moral* (1854); *Life of Josiah Quincy* (1867).

**Quincy, Josiah** (1744-75), American lawyer and patriot. He is remembered for having defended, with John Adams (1770), the British soldiers implicated in the Boston Massacre. Both as an orator and as a writer, his influence upon his times was great. His *Reports of the Supreme Court of Massachusetts Bay* was edited by S. M. Quincy (1865), and there is a *Memoir* by his son, Josiah (2d ed. 1875).

**Quincy, Josiah** (1772-1864), American lawyer and orator, son of Josiah Quincy (1744-75). He was elected as a Federalist to the Ninth, Tenth, Eleventh and Twelfth sessions of Congress (1806-13). He was a member of the State senate, and State house of representatives. He was a delegate to the Constitutional Convention of 1820, and he was mayor of Boston in 1823-29, and president of Harvard College in 1829-45. He published a *Memoir of Josiah Quincy, of Massachusetts* (1825-1875), *History of Harvard University* (2 vols. 1870), *Life of John Quincy Adams* (1858), etc. There is a *Life* (1867) by his son, Edmund.

**Quinet, Edgar** (1803-75), French man of letters. Among his principal works are *Prométhée* (1838), *Les Esclaves* (1853), and *Merlin l'Enchanteur* (1860), poems; *Les Révolutions d'Italie* (1848-52) and *La Révolution* (1865), both historical works; and *La Génie des Religions* (1842) and *La Création* (1870). His *Œuvres Complètes* appeared in 28 vols. in 1877-9. Consult Heath's *Edgar Quinet, his Early Life and Writings*.

**Quinine**,  $C_{20}H_{21}N_3O_2 + 3H_2O$ , an alkaloid extracted from cinchona bark, with the other alkaloids present, by treating a mixture of the powdered bark and lime with a solvent, such as alcohol or light petroleum. After purification by solution in weak acids and precipitation, the quinine is separated by conversion into sulphate and by crystallization, and forms silky, needle-like crystals with an intensely bitter taste. Quinine is used chiefly in malaria, acting upon the malarial parasites as a proto-plasmic poison (see MALARIA).

**Quinnat** (*Oncorhynchus tshawytscha*), the most valuable of the salmon of the Pacific Coast. It is the principal species of the Columbia and Sacramento Rivers.

**Quinoa**, a plant (*Chenopodium quinoa*) cultivated in Peru and Chile, for its edible seeds, which are roasted like coffee, and used in the preparation of a decoction known as *carapulque*.

**Quinoline, Leukol, or Leukoline**,  $C_8H_7N$ , a basic compound of double ring

structure, like naphthalene, but with one of the CH groups in the *a* position replaced by a nitrogen atom. It forms salts, and is the parent substance of a number of dyestuffs. It is also used in medicine, having antiseptic and antipyretic properties.

**Quinone**,  $C_6H_4O_2$ , a diketone, derived from benzene by replacement of the two hydrogen atoms in the *para* position by oxygen atoms. It is soluble in water, and when reduced forms hydroquinone, a compound much used as a photographic developer.

**Quinquagesima**, the Sunday immediately before the first Sunday in Lent.

**Quinquereme**, an ancient type of ship-of-war, introduced by Dionysius of Syracuse about 400 B.C. They were propelled by five banks of oars on each side.

**Quinsy** or **Peritonsillar Abscess**. See **Tonsils**.

**Quintain**, a mark or figure for tilting at with lances or poles. The pastime, common in the middle ages, was continued till the 18th century as a wedding sport.

**Quintal**, a French weight, generally of 100 lbs., corresponding in its uses to the hundredweight of Great Britain.

**Quintana, Manuel José** (1772-1857), Spanish man of letters. His best-known poems are *Oda a Padilla*, *El Panteón del Escorial*, *La Invención de la Imprenta*, and a patriotic poem calling his countrymen to arms.

**Quintet**, a species of musical composition in five parts. Instrumental quintets may be written for one particular class of instrument or for a combination of various kinds.

**Quintilian** (40-c. 100), whose full name was Marcus Fabius Quintilianus, went to Rome before 59 A.D. He gained distinction there, as a teacher of rhetoric, and was the first public instructor paid by the State. Among his pupils was Pliny the Younger. His chief work, still extant, was a complete treatise on rhetoric in twelve books, entitled *De Institutione Oratoria libri xii.*, or simply *Institutiones Oratorie*.

**Quintuplets**, five children born at the same time. Twin births occur once in about 88 births, triplet births once in about 7,700 births, quadruplet births once in about 6,000,000 births. It would be expected, by Hællin's Law, that quintuplet births would occur once in 500,000,000 births, or practically once in a generation. Actual occurrences are more frequent, yet, until 1934 no case has been reported where the children have lived. In that year, in Callender, Ontario, were born the

Dionne Quintuplets, all girls. Their combined weight was less than 14 pounds at birth. Dr. A. R. Datoe, the local physician, was in attendance. The Ontario government and Canadian Red Cross Society acted as guardians of the quintuplets and erected a hospital especially for them. Later, the babies were made wards of the King by act of the provincial Legislature and nuns of a Roman Catholic order took the places of the Red Cross nurses. It was estimated that 450,000 persons visited the Datoe Nursery in the summer of 1936. From an observation gallery, visitors were able to see and hear the children without being seen or heard by them. On May 28, 1936, their second birthday, announcement was made that a motion picture contract had been signed that provided \$250,000 in cash for the children. This, in addition to other money received, made their earnings \$750,000 by the time they were six years old. The running costs of the Nursery, amounting to about \$26,500 a year, were paid out of the quintuplets' earnings. In 1941 Dr. Datoe reported that the children were about 30 per cent heavier than the average child of their age.

**Quirinus**. See **Romulus**.

**Quisling, Vidkun Abraham Lauritz** (1887-1945), Norwegian major, head of the Norwegian Nazi party. On German invasion of Norway (April, 1940) he accepted chief place in the Nazi-sponsored government. 'Quisling' has come to stand for traitor. At the close of World War II he was put on trial in Norway and condemned to die as a traitor, Sept. 10, 1945.

**Quito**, capital of Ecuador, and of the province of Pichincha, South America, in an enclosed basin of the Andes near the equator. It has an elevation of 9,350 ft. above sea level, with strikingly picturesque and impressive views, including some of the highest peaks of the Andes.

**Quit-rent**. In England it was formerly the custom to reserve a nominal rent upon making an otherwise absolute grant of land, as a sort of recognition of feudal tenure by the grantee. This was known as a quit-rent. The term is sometimes used in the United States, not in consideration of release of feudal services, but as part consideration for the property.

**Quoins**, wrought stone blocks at the corners of buildings, from which they may project slightly, with either splayed, curved, or sharp edges.

**Quoits**, a popular British game. The quoit is a direct descendant of the Latin *discus*, a ring of iron or stone, from 10 to 12 inches in

diameter, and thrown as an exercise of strength or skill. Deck quoits, for use on shipboard, are made from rounds of rope.

**Quorum.** In mediæval times in England a commission granted to the justices of the peace of a county ran to the effect that any two of the justices might try offences, one of whom (*quorum*) must be selected from certain named justices. By an extension of its use the term came to be applied to any number of persons, or any particular persons, whose presence at a

meeting is necessary to validate its proceedings.

**Quo Warranto** (*Lat.* By what authority). A legal proceeding instituted to determine judicially the right of a claimant to an office or franchise. This proceeding is in theory instituted for the benefit of the public, but incidentally may help individuals. It lies where one unlawfully usurps an office or franchise, or forfeits it by non-user or bad conduct.

**Q. V.** (*quod vide*), 'which see.'

**R.** The sound *r* includes a number of varieties which are formed in several different ways. It is got by trilling the top of the tongue, the soft palate, and other parts. In ordinary present day English usage *r* is not given a pronounced trill, but the older English lingual trill is widely used—e.g., by Welshmen and Scotsmen. Parisian *r* is uvular, and may be regarded as the standard French *r*; the same sound is gaining ground in Germany also. Generally in the United States and English-speaking Canada, *r* is fully sounded regardless of the position of its occurrence in a word. The custom of *r* silent when following a vowel, once so noticeable in New England and parts of the South, is gradually falling from use.

Voiceless *r* occurs in French at the end of words like *quatre*, and in Welsh in the combination *rh* (e.g. 'rhos'). Greek *ρ* is the early Semitic form, but with the loop transferred from the left to the right. The additional stroke of Latin *R* is found in some of the Greek alphabets also. *r* is one of many reversions towards Greek *ρ*.

**Rabat**, fort. seapt., Morocco, on w. coast, opposite Salee. Carpets and pottery are manufactured; wool, skins, beans, olive oil, and wax are the principal exports; p. 38,000.

**Rabbet**, or **Rebate**, a rectangular groove along the edge of a board. See CARPENTRY.

**Rabbi** ('my master'), a Jewish title for teachers, which came into use in the first Christian century. The qualification for the office varied at different periods. It is now the popular designation for a Jewish minister.

**Rabbit.** In the United States and Canada the name rabbit is given to any hare, and especially in the East to the common little gray wood hare (see HARE). Properly, however, it should be restricted to the European *Lepus cuniculus*, which differs from its relatives, the hares, in being a burrower, and in having its young born blind, naked and helpless. They are enormously prolific, and are excessively destructive when they obtain access to gardens. The rabbit is about 16

in. in length. The color is naturally reddish brown, the under surface and the lower part of the tail being white, but domesticated rabbits exhibit wide color variation. Not only the flesh but the fur has a market value, as material for making felts and under the French word for rabbit, *lapin*, is very popular for coats. The fur reaches its greatest length and fineness in the Angoras. Other important breeds are the Belgian rabbits, the chinchillas, and the white Himalayan breed.

**Rabbit-fish**, a voracious, dark-brown sea fish (*Promethichthys promethus*) of the tropical part of the Atlantic ocean, allied to the mackerels, and excellent as food.

**Rabelais, François** (?1483-1553), French humorist, was born at Chinon in Touraine, the year being variously given as 1483, 1490, and 1495. He took on the habit of a monk, and in 1519 held some position in the Franciscan convent, but he later abjured the monastic life, and entered the faculty of medicine at Montpellier. In 1532 appeared *The Great and Inestimable Chronicles of the Grand and Enormous Giant Gargantua*, concerning whose attribution to Rabelais critics are not agreed. The earliest dated edition of *Pantagruel* which we possess is of the year 1533, and of *Gargantua* 1535. In 1546 he published the third book of *Pantagruel*. The fourth book of his great work appeared in 1552, but it was censured by the Sorbonne, and for a time its sale was stopped. Next year Rabelais removed to Paris, where he is supposed to have died shortly after his arrival. In 1564 the fifth book was published, the authenticity of which is pretty generally acknowledged. A genius who interprets contemporary life in the form of satire, beneath his exterior of burlesque and buffoonery Rabelais possesses the profoundest learning and the boldest philosophy. Of the numerous French editions of his works the best in modern times is that by C. Marty Laveaux (6 vols., 1868-1903).

**Raccoon**, a genus (*Procyon*) of small American carnivores which resemble the bears in structure and descent. The common rac-

coon (*P. lotor*) is found throughout North America and in many parts of Mexico. The body is strongly built, the head broad behind, but tapering in front to a sharp muz-

of their fur, and also hunted at night with the aid of dogs.

**Race.** See **Ethnology**; **Species.**

**Race, Cape,** the southeastern extremity of



*Photos by Newman, Berkhamstead.*

*Show Breeds of Rabbits.*

Upper Left, Blue Dutch; Upper Right, Blue Angora; Center, Dutch-Marked Angora; Lower Left, English Rabbit; Lower Right, Flemish Giant.

zle, and furnished with small and rounded ears. The head and body together measure from 22 to 26 in., the tail, which is ringed with black and white, being about ten ins.

Newfoundland. It has a lighthouse whose light, 180 feet above the sea, is a beacon for vessels on the North Atlantic route.

**Raceme**, an inflorescence in which the



*Raccoon.*

long. The body color is brownish. The fur is long, soft, and thick, and the pelt has commercial value. Raccoons are diligently trapped in many parts of the country for the sake

flowers are borne on pedicels of equal length along a central rachis, usually elongated.

**Racemic Acid**,  $\text{COOH}(\text{CHOH})_2\text{COOH}$ . is that mixture of levo- and dextro-tartaric

acids that sometimes occurs naturally along with the ordinary (dextro) form of tartaric acid, and also results when tartaric acid is obtained synthetically. See TARTARIC ACID.

**Rachel**, wife of the patriarch Jacob, was a daughter of Laban, who demanded of Jacob fourteen years service for her. She was the mother of Joseph and Benjamin. See JACOB.

**Rachel, Elisa** (1821-58), French actress, was born of Jewish parents, named Félix, in Switzerland. In 1837 she appeared at the Gymnase in *La Vendéenne*, and next year began her career at the Français as Camille in Corneille's tragedy of *Horace*. Supreme in the classical dramas of Corneille, Racine and Voltaire, she excelled by dint of will, intellect, facial expression, and beauty of tone. Her two greatest parts were *Phèdre* (1843) and *Adrienne Lecouvreur* (1849).

**Rachmaninov, Sergei Vasilyevitch** (1873-1943), Russian composer and pianist. After years devoted to composition and to teaching in a school in Moscow, he was conductor of the Moscow Private Opera (1897-99) and of the Moscow Imperial Theatre (1904-06). He subsequently played and conducted in other European cities and in America. In addition to *Aleko*, he composed the operas *The Niggardly Knight* and *Francesca da Rimini*; three symphonies; four piano-forte concertos and numerous other pieces.

**Racine, city**. Wisconsin, county seat of Racine co., on Lake Michigan, 22 m. s.e. of Milwaukee; p. 67,195.

**Racine, Jean** (1639-99), French dramatist. In Paris he made the acquaintance of La Fontaine, Molière, and Boileau, the four writers forming what is known as the 'quartette of the Rue de la Colombyer,' which proved so influential in French letters. Meantime his *Odes to the king*—in particular *La Renommée aux Muses*—had attracted the monarch's attention, and a pension was assigned him (1664). The first result of Racine's connection with Molière was the production of *La Thébaïde* by the latter in June, 1664. Racine's second acted play, *Alexander the Great*, was produced by Molière's company in December, 1665. During the next thirteen years Racine produced his greatest work. His plays followed in this order: *Andromaque* (1667); *Les Plaideurs* (1668), a delightful little comedy of satire against lawyers, which Molière was the first to appreciate; *Britannicus* (1669), which Voltaire styled 'la pièce des connaisseurs'; *Bérénice* (1670); *Bajazet* (1672); *Mithridate* (1673); *Iphigénie* (1675), a masterpiece of pathos; and *Phèdre*

(1677), marvelous representation of a human agony. In 1689 he wrote *Esther*, in answer to a request from Madame de Maintenon for a play suitable for her girls at Saint-Cyr. *Athalie* followed in 1691.

**Racing**. See Yacht, Track and Field Athletics, Rowing, Horseracing.

**Rack**, an instrument of torture, consisting of a frame on which the victim was strapped, while his limbs were extended by a windlass at each end until his joints were dislocated, or he succumbed from the pain.

**Rackets**, or **Racquets**, a wall game, somewhat similar to FIVES, except that it is played with a racquet and not with the gloved hand. The game is played with a racket similar to a tennis racket but with a longer handle, and a hard ball.

**Rackham, Arthur** (1867-1939), British illustrator and water color artist, was born in London.

**Radar** (abb. of Radio detecting and ranging), a locator using ultra-high frequency radio waves. Called the greatest secret weapon of W. W. II, it was announced in 1943, although it had been in use since 1940-41, when it won the Battle of Britain. Radar sends out short radio waves (they travel 186,000 m. a sec.), which search the air for many miles up and around, through fog, smoke, rain, or snow. When the waves strike a ship or airplane they bounce back and flash their findings on the radar plotting board. They tell altitude, speed, and course of approaching ship or plane, thus making it possible to bomb successfully unseen targets as well as warning of an enemy's approach. Radar was discovered in 1922 by the Am. scientists Dr. A. Hoyt Taylor and Leo C. Young. Gen. Electric and Bell Telephone scientists assisted in its development, and much basic research was done by the Bureau of Standards' radio division. In Br. the radio locator, as the Br. call it, was developed in 1935, and within two years was in day-and-night secret production. Radar warned of the approach of Jap planes at Pearl Harbor, but was disregarded. The Radiation Laboratory at Mass. Inst. of Tech. became world's center of knowledge in radar during W. W. II; 900 scientists and 9000 workmen worked there in secrecy for five yrs. Among other uses of radar developed was the Loran long-range navigation system to replace the stars as navigational aids.

**Radcliffe, Mrs. Ann** (1764-1823), English novelist, was born in London. *The Romance of the Forest* (1791) established her position,

which was enhanced by her highest achievement, *The Mysteries of Udolpho* (1794). These works, evincing command of thrilling narrative and rare descriptive power, proved her vigorous originality and her sense of natural beauty. Her last romance, *The Italian*, with its strong character Schedoni, appeared in 1797.

**Radcliffe College**, an institution of higher education for women in Cambridge, Mass., established by the Society for the Collegiate Instruction of Women in 1870, its present title being assumed in 1894 in recognition of the gifts of Anne Radcliffe to Harvard University. The college stands in intimate relations with Harvard, all of its faculty being Harvard instructors, while its requirements and courses are, with slight exceptions, identical with those of Harvard, and Radcliffe students are admitted to many graduate courses in the university. Ada Louise Comstock has been the president since 1923.

**Radegundis, Saint** (510-87), the patron saint of Poitiers, France. She became the wife of Clotaire, king of the district, but when her husband murdered her brother she fled to a monastery in Noyon. Later she founded a monastery at Poitiers where she served as a sister.

**Radetzky, Johann Joseph, Count** (1766-1838), Austrian field marshal, was born in Trzebnitz Castle near Tabor in Bohemia. He was mainly responsible for the victory of Kulm against Napoleon in 1813, and for that at Leipzig. It was the Italian insurrection of 1848, however, which gave him his chief prominence, when he crushed the Sardinian forces and captured Milan and Venice, and thoroughly subjugated the whole of northern Italy.

**Radial Artery**, the artery beginning just below the bend of the elbow on the flexor or palm side of the forearm, forming with the ulnar artery the bifurcation of the brachial artery. The radial passes down the front of the arm, on the thumb or radial side, to the wrist, where it lies superficially on the bone, and therefore is conveniently located for examination of the pulse. It then winds to the back of the wrist, forward again between the metacarpal bones into the palm of the hand, which it crosses, and joins a branch of the ulnar to form the deep palmar arch. See CIRCULATION OF THE BLOOD.

**Radiant**, a point in the sky from which meteors belonging to the same system ap-

pear to diverge as they shoot across the sphere. It is really the perspective vanishing-point of their parallel tracks, and its position depends upon the direction from which they encounter the earth. It is hence the most essential element for the calculation of meteoric orbits.

**Radiant Energy and Radiation.** The transmission of light outward from a luminous source is the most familiar of all recognized forms of radiant energy. We seem to see the rays or paths along which the energy passes, but we do so in virtue of the dust particles floating about in the air, which scatter and reflect in all directions part of the energy falling upon them. The energy is, strictly speaking, passed on in the form of wave-motion, the crests and troughs being perpendicular to the direction of the ray. Another familiar form of radiant energy is sound, though that does not at first appeal to us as characteristically radiant. Inasmuch, however, as sound is transmitted outward from a centre of disturbance as wave-motion, it is fundamentally as radiant as light. Nevertheless it is usual in physics to limit the term radiant energy to those kinds of radiation which are transmitted through the ether. These consist, in addition to light, or luminous radiations, of infra-red, or so-called heat rays; ultra-violet, or so-called actinic rays; X-rays and the so-called gamma rays of radium, both of which are merely very high frequency ether radiations; and ordinary electromagnetic waves of the kind used in wireless telegraphy or telephony, which are merely very low frequency ether radiations.

By studying the spectrum of the glowing carbon of an electric arc light, we can demonstrate the existence of the first three of these types of radiation, which differ among themselves only in having different wave lengths and refrangibilities. The luminous spectrum is plainly visible, showing all the colors from red to violet. Again, below the red, with longer wave-lengths, lie the so-called dark heat or infra-red rays. The infra-red rays are not, in a strict sense, any more heat rays than are all the other ether radiations. They merely produce *larger* heating effects upon absorption in matter than do most of the other radiations mentioned. They differ from visible light rays only in their longer wave-length. It is obvious that the rate at which a radiating substance loses energy by radiation depends in some way



upon the temperature of the body. Both theoretical and experimental investigations have shown that through a great range of temperature a given rough or black surface will emit radiant energy at a rate proportional to the fourth power of the absolute temperature. For the more practical aspects of electrical radiations, see ELECTROMAGNETIC WAVES.

**Radical**, a term applied to a person, party, or movement advocating extreme measures directed towards political reform. In *Great Britain* the Radicals counted among their numbers such notables as James Mill, Joseph Hume, Bentham, Grote, Ricardo, John Stuart Mill, Thomas Paine, Bright, and Chamberlain. There has never been an organized Radical Party in the *United States*.

**Radicals**, or **Radicles**, or **Residues**, are unsaturated groups of atoms that pass unchanged from compound to compound. Like simple elements they have no separate existence. The instant of their liberation they become saturated compounds in either pairing among themselves, or uniting with other elements. Radicals are derived by removing one or more atoms from certain saturated compounds. For example, the  $\text{—OH}$  (hydroxyl) radical is theoretically derived by removing one hydrogen atom from water ( $\text{HOH}$ ).

**Radio**. This term is decidedly general although there is a tendency in some localities to use the word 'radio' as meaning specifically a radio receiver. 'Radio' covers the entire field known as 'wireless,' which word signifies all forms of communication of audible and visible effects by means of electrostatic-electromagnetic waves. This article merely classifies the fields of major importance as to present-day use. It does not consider the technical theory nor the details of any equipment involved. For specific information covering the principles of operation and description of the apparatus refer to articles on WIRELESS TELEPHONY and WIRELESS TELEGRAPHY.

In a broad sense the source or the apparatus responsible for the production of these electrostatic-electromagnetic waves is the transmitter. Similarly the receiver consists of the apparatus which intercepts these waves and is responsible for the reproduction of the original audible or visible effects which occurred at the transmitter. The ultimate effect at the receiver may be converted into various indicative, signaling or recording re-

sults. As the electrostatic-electromagnetic waves require no medium for their propagation there is no necessity for any fixed distance relationship between transmitter and receiver. Furthermore a transmitter may readily communicate with any number of receivers simultaneously irrespective of whether any individual receiver is stationary or is in motion as on a train, automobile, ship, airplane, etc. The entire long distance radio communication art dates back to Dec. 12, 1901, when Marconi in Nova Scotia received the first trans-oceanic radio message from his station in England. Short wave transmission and reception has been developed highly since its general adoption for this work in 1924. Long wave communication, however, is widely used for long distance international telegraphy. Frequencies in the band from 10,000 to 100,000 cycles per second are employed, as this range has proven to give the greatest degree of reliability. More power is required than for short waves to cover the same distance.

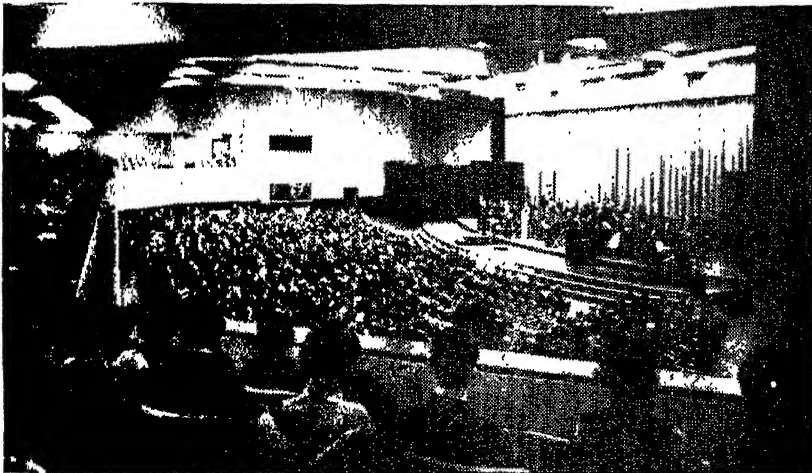
Radio service reports of weather and meteorological advices have been in regular operation for quite some years. Storm warnings, time signals, reports on menaces to navigation such as icebergs, derelicts, etc., have been of immense value to shipping and have also been of benefit over the land. Market reports together with timely advice in fields such as agriculture are conducted by several governments. There are press services for the rapid transmission and distribution of news. This applies to ships as well as shore service. It makes possible the printing of an up-to-date newspaper aboard ship, containing the latest news. Photography, maps, charts, etc., have been reproduced over trans-oceanic distances. It is possible to reprint a newspaper at a distant point by photo radio. In television, images in motion of the objects focused at the transmitter are reproduced at the receiver. Sound effects may be reproduced simultaneously over the regular broadcast system working in conjunction with the television apparatus, but they are two separate and distinct transmitters and receivers. See TELEVISION.

Radio Circuits and radio apparatus have been used extensively for making various types of measurements and tests in the industrial world. Furthermore, tubes and speakers developed by the use of radio have been commonly adapted to many other purposes. Radio waves have been used in locat-

ing oil and mineral deposits, in detecting flaws in metals and in developing high lever in humans. The development of broadcasting has probably been more extensive in the United States than in any other country. The fact that over 600 stations are in operation, about half of them simultaneously, has made the problem of frequency or wave length assignment a difficult one. Another interesting development has been the establishment of short-wave stations for the transmission of broadcasting programs to a distant country, primarily for the purpose of re-transmitting the program over the regular broadcast stations of that country. Valu-

other data that would advise of any dangerous condition that might interfere with the safety of flying or landing.

The use of radio broadcast receivers in automobiles is quite commonplace, and also some taxicabs in the large cities are thus equipped. Radio police service is proving very valuable in the running down of crime, special radio equipped cars receiving information from the transmitter at headquarters. Since 1935, two-way radio communication for police cars has come into general use and has increased the efficiency of police work. Passengers on air liners may now send radio messages while en route. The joint use



*Broadcasting: Auditorium Studio, Radio City.*

able service was first rendered by radio communication with ships in distress at sea. There are many instances on record where radio has been responsible for the rescue of human life. According to the provisions adopted by the International Convention for the Safety of Life at Sea, all passenger vessels having a tonnage of 5,000 or over must now carry radio direction finding equipment. The successful application of radio to aircraft communication involves the solution of many additional problems not encountered in other service. One of the most valuable phases of this service takes in the radio beacon enabling the airplane to approximate its position and particularly to be able to easily ascertain and closely follow the proper course. Also of tremendous importance is the service of supplying advance knowledge of weather information. This includes any

of wire telegraph and telephone systems in conjunction with radio or wireless systems is rapidly becoming more widespread. At present there are about 30,000,000 telephones throughout the world which afford means of communication by the combined use of wire and radio telephony. Telephone service across the Atlantic Ocean was put on a full time or 24 hour basis in September, 1929. The service is well established for telephone communication between any land telephone subscriber and voyagers at sea on several large ships. In 1941 there were 52,000,000 receiving sets in use in the U. S. Also 7,500,000 cars were equipped with radio in 1941. Perfection of short-wave radio and its commercial production at a low retail price has brought it into general use. The Federal Communications Commission was established in 1934 to regulate radio, succeeding the

Federal Radio Commission. It also exercises regulation over wire telephones and telegraph. The Commission is vested with authority to protect the public rights on the air, review radio programs and investigate charges of any infractions of the rules which it promulgates. It issues broadcasting licenses and determines the power to be used by each broadcasting station. There are a number of powerful stations in the United States each operating with 50,000 watt power. A North American Regional Broadcasting Agreement was entered into in 1937, by the United States, Canada, Mexico, Cuba, Santo Domingo and Haiti, and was ratified by the U. S. Senate in 1938. It provides the instrument whereby service may be afforded by stations in the various countries with the minimum of interference from other stations. Without such co-ordination the increasing number of stations was progressing toward a chaotic condition in American broadcasting. In Europe, broadcasting difficulties were to a considerable extent regulated by the Pact of Lucerne, 1933, under which 28 countries of Europe, Africa and Asia Minor signed rules concerning time allotments, frequency and power; but these regulations and subsequent improvements became badly disrupted when war occurred in Europe in 1939, and naturally the war of propaganda on the air intensified, as did efforts by each nation to overpower and produce interference with its enemy's radio. The voices of leading statesmen, correspondents, and commentators of Europe are frequently heard in millions of American homes.

**Radioactivity**, the property, possessed by certain bodies of emitting, spontaneously, characteristic rays, invisible to the eye and capable of penetrating substances impetrable by ordinary light. Becquerel, in 1896, while investigating various properties of phosphorescent bodies, discovered that compounds of uranium, when left in the neighborhood of a photographic plate in a perfectly dark room, affected the plate, even though it were wrapped in black paper. In addition to this photographic action through a covering opaque to ordinary light, it was found that uranium compounds caused the air in their vicinity to become a conductor of electricity; so that, for example, a charged gold-leaf electroscope placed near a small quantity of uranium rapidly lost its charge, exactly as if the air had been made a conductor by the passage of Röntgen rays. Pro-

fessor and Madame Curie proved, in 1898, that there are only two ordinary, well known elements which possess in appreciable degree this property of radioactivity, and these two are those which have the heaviest atoms, namely uranium and radium. The radiations from radioactive substances have been called Becquerel rays, after their discoverer. They consist of three types, which have been named the  $\alpha$  (alpha),  $\beta$  (beta), and  $\gamma$  (gamma) rays respectively.

The  $\beta$  rays, which are in many respects the simplest, are rays similar to cathode rays of high velocity (see VACUUM TUBES), and consist of negatively charged particles (negative 'electrons') whose mass is  $1/1845$ th of that of an atom of hydrogen, travelling with stupendous velocities which range from  $1/10$ th the velocity of light up to very close to that velocity, namely 186,000 m. per second. They can be deflected by a magnetic or an electrostatic field in a similar manner to the cathode rays. The  $\gamma$  rays are about a hundred times more penetrating than are the  $\beta$  rays and are not deflected by a magnetic field, however strong. They are entirely distinct from the  $\beta$  rays, since, instead of being projected corpuscles, they are, like Röntgen rays, ether radiations of very high frequency, i.e., of very short wave length. These ether radiations accompany the production of the  $\beta$  rays in much the same way that the Röntgen rays are formed in a vacuum tube by the sudden stoppage of cathode rays by a suitable object.

The  $\alpha$  rays are, however, the most important, representing, in general, as much as 99 per cent. of the total energy radiated. They consist of projected particles, positively charged, of a mass the same as that of the helium atom. Indeed, they are the same as the nucleus of the helium atom, and become neutral helium atoms as soon as their two free positive charges (positive electrons) have been neutralized by the attachment of two negative electrons or  $\beta$  particles. The most remarkable feature of radium is the way in which it emits energy. Its  $\gamma$  radiations are exceedingly penetrating, one or two milligrams of fairly pure radium enclosed in a leaden tube with walls  $1/4$  inch in thickness discharging quite rapidly a gold-leaf electroscope held anywhere near it. Radium preparations are also self-luminous, and possess extraordinary power of bringing about chemical action: thus, when dissolved or suspended in water, they set free oxygen and hydrogen; they cause elements to change into their allotropic forms—e.g., ordinary to

red phosphorus; they make glass and the halides of potassium and sodium become colored, etc. They also affect photographic plates in their neighborhood; and bring about luminescence of substances, such as barium platinoeyanide and zinc blende. Added to this, their presence has worked physiological effects, destroying tissues when the radiations act upon them too long or too intensively. Fortunately, the radiations also destroy disease cells of certain types, as well as normal tissue. This is notably the case in malignant tumors (See CANCER) and in certain superficial tumors, as red lupus. Consult Millikan's *The Electron* (1917); Soddy's *The Interpretation of Radium* (1920).

**Radiography.** Through this process, by the use of portable million-volt X-ray equipment, radiographs were being made in factories daily in 1942. These X rays detect buried flaws through eight inches of steel. More powerful equipment is being developed.

**Radiometer**, a device invented by Sir William Crookes to exhibit the motion caused by the action of light. The instrument consists of a light horizontal vane, formed of four metal discs, supported by cross arms at right angles on an easily moving pivot in a highly exhausted glass globe. The discs are brightly polished, and blackened on alternate sides, and when exposed to light rotate round the vertical axis at a rate that depends on the brightness of the light. This behavior is probably due to the gas left in the globe under the heating effect of the rays. Thus the black sides of the discs become hotter, so that the gas molecules left in the bulb acquire a greater velocity when they fly off after striking the black sides than the bright. This difference in velocity of the molecules causes a corresponding difference in the reaction on the vanes, so that rotation occurs.

**Radiophotography.** See **Telephotography**.

**Radiotelegraphy**, and **Radiotelephony**. See **Radio**; **Wireless**.

**Radish** (*Raphanus sativus*), a garden vegetable belonging to the family *Cruciferae*, cultivated for the sake of its thickened edible root, which is eaten raw. In order to attain the best quality, the plant should be grown quickly in a rich, light, loose soil.

**Radium**, Ra (atomic weight, 226), a highly radio-active element discovered by M. and Mme. Curie in 1898. Although it is widely distributed in very minute quantities, its principal source was originally the pitchblende of Joachimsthal, in North Bohemia, which yields

about 1 part in 3 million. At the present time, however, almost the whole of the world's supply comes from the carnotite sands of Colorado and adjacent regions of the United States, which contain about 2 per cent. of uranium nitrate. Though radium is always obtained in practice in the form of a bromide or a chloride, the element itself was successfully isolated in 1911, by Mme. Curie and Debierne, who subjected the amalgam to distillation in an atmosphere of pure hydrogen. After all the mercury has been expelled, a brilliant white metal—practically pure radium—was obtained. Metallic radium alters very rapidly in contact with air, decomposes water energetically, and is considerably more volatile than barium. Direct tests showed that the increase of activity occurs in accordance with the law of the production of emanation, the limit of radio-activity of the metal being about normal. The primary uses of radium are in producing self-luminous paints for watch dials, etc., and in the treatment of certain types of diseases, as cancer and skin affections. In radium hospitals it is the first disintegration product of radium, namely, the so-called radium emanation, which is brought into proximity to the diseased part rather than the radium itself. A machine for the artificial production of radium from such common substances as table salt and phosphorus has been developed. The artificial radium differs from true radium in its brief life time, which is 15 hours instead of 1700 years. Doctors hope that, because of its low price, it may be used more extensively in medical practice. See **RADIO-ACTIVITY**.

**Radius.** See **Circle**.

**Radius**, in anatomy, the smaller of the two bones of the forearm. It forms the smaller part of the elbow joint and the greater part of the wrist.

**Radom**, town, Poland, 60 m. s. of Warsaw. Is of much commercial importance; manufactures leather products and machinery. It suffered greatly in the Swedish war of 1701-7, and figured prominently in the maneuvers of the Russian and German armies during the World war; p. 65,000.

**Raeburn**, Sir Henry (1756-1823), Scottish portrait painter, sometimes called the Scottish Reynolds, was born in Stockbridge, near Edinburgh. He was elected president of the Society of Scottish Artists and an associate of the Royal Academy in 1812, and became a Royal Academician in 1815. Among his sitters were Sir Walter Scott and Christopher North.

**Raemakers, Louis** (1869- ), cartoonist, born in Roermond, Holland. During World War I his cartoons had great influence. He came to the U. S. in 1940.

**R.A.F.**, the Royal Air Force of Great Britain.

**Ragtime**, in music, is a strongly syncopated melody superimposed on a regular accompaniment. The term was first applied to certain southern negro melodies but it has been colloquially extended to any popular music characterized by marked syncopation.

**Ragusa** (Slav, *Dubrovnik*), tn., Dalmatia, situated at the foot of Mount San Sergio, on the eastern shore of the Adriatic. The chief points of interest are the Franciscan Church (14th century); the Rector's Palace, a beautiful Renaissance building; the Cathedral (17th century); the Dominican monastery; and the theater and museum. Ragusa was founded in the seventh century by refugees from Epidaurus. From the fifteenth century to 1806 it was an independent republic under the protection successively of Venice, Hungary, and Turkey, and was famous for its maritime activity and for a remarkable literary movement. It was annexed by Napoleon to the Kingdom of Illyria and was awarded to Austria in 1814. Following World War I Ragusa passed to Yugoslavia under the terms of the Peace Treaty; p. about 18,767.

**Ragweed**, a name applied to any species of the composite genus *Ambrosia*. *Ambrosia artemisiifolia*, known also as Roman wormwood or hogweed, is a common pest in meadows and pastures in all parts of the United States. It grows from one to five feet in height, with long deep green leaves, twice pinnatifid, and small greenish flowers. Its juice is bitter, and when the weed is eaten by cattle, imparts a bitter flavor to the milk. Giant ragweed (*A. trifida*) is a huge coarse plant from 4 to 10 feet high, found in fields and waste places from Nova Scotia to Florida and westward to Nebraska and Colorado. It is commonly accepted as the chief cause of hay fever, or more properly autumn fever, in the United States.

**Ragwort**, is the popular name of any one of several herbs of the genus *Senecio*, of the aster family (*Compositæ*), with irregularly lobed and toothed leaves; especially the Golden Ragwort and Woolly Ragwort of the United States.

**Rahbek, Knud Lyne** (1760-1830), Danish author, was born in Copenhagen. As a crit-

ic he exercised an important influence on Danish literature.

**Rahu**, in Hindu mythology, the demon supposed to cause eclipses.

**Rahway**, city, Union co., New Jersey, at the head of navigation on the Rahway River. A residential suburb of New York, it is important also for its manufactures. The New Jersey State Reformatory is situated near here. Besides chemical, oil and barrel industries, Rahway is the seat of a large press and bindery which manufactures books issued by many New York publishers. Two miles away, in Linden, are the refineries of the Standard and other leading oil companies; p. 17,498.

**Raichur**, town, India, 80 m. n.e. of Bellary. It is famous for its glazed pottery; p. 26,000.

**Raid**, a hostile incursion into the territory of a state by an armed force acting without the authority or sanction of any politically organized society. The state whose territory is raided need not, and does not, extend the rights of belligerents to those taking part in such an attack upon it, but may punish them according to its own laws without incurring any responsibility to the state whose subjects they may be. On the other hand, if the government of the country to which the raiders belong has negligently permitted the preparation of such an unlawful expedition in its own country, it may justly be held liable for the damages which are the natural and probable consequences of its neglect, though, of course, such a liability, unless voluntarily admitted or submitted to arbitration, can only be enforced by war.

**Rail**, a general name for the birds belonging to the family Rallidæ, which includes the coot, corndrake, gallinule, and other species, most of which frequent marsh lands. The head is small, the body greatly compressed, the legs and toes long, the wings short and rounded, the tail short, and the bill straight and rather long. The plumage is loose, and in typical rails is a motley of delicate browns and grays with transverse darker markings. Several species of rail occur in the United States.

**Railroads**, a term generally used in reference to a system of transportation wherein cars carrying persons or commodities are moved in trains, by mechanical traction, over a roadbed or structure along which the flanged wheels of the cars are guided by rails. The first really successful application of the steam locomotive was made on a mine railroad near



RAILROAD PATHFINDERS

Newcastle-on-Tyne, with George Stephenson's famous 'Puffing Billy' in 1814. The origin of railroad transportation in the *United States* is generally traced to the short line built at Quincy, Mass., in 1826, for the purpose of bringing down from the quarry the granite used for the Bunker Hill Monument. This line operated by gravity, the loaded cars moving down hauling the empty cars back by means of a cable running on a wheel at the top. The first line to which the term railroad in its modern sense can be applied was the Baltimore & Ohio, which was chartered in 1827 and the construction of which was begun in 1828.

After the Civil War, construction was resumed, and a boom period was begun which lasted from 1867 to the panic of 1873. In 1869 the first transcontinental line, the Union Pacific and the Central Pacific from the Missouri River to San Francisco, was opened, the two lines meeting at Salt Lake City on May 10 of that year. The decade from 1880 to 1890 was the period of greatest expansion, no less than 70,000 miles of new lines being built. The interval from 1884 to the present time may be termed the conservative era of railroad building, the enterprises as a whole being planned to meet legitimate needs of transportation as the country has developed. In this time, and more particularly in recent years, railway development has been intensive rather than extensive. New construction has been in the form of second, third, or fourth track, new and more modern and efficient freight and passenger terminals, new engine-houses and shops, heavier bridges, realignment projects for the purpose of eliminating grades and curvature and installations of signals to improve safety of operation or to effect increase in trackage capacity. In locating a railroad line, advantage is taken of favorable water courses, passes, and other geological formations to permit reduced grades and the minimum of curvature, and to avoid cutting and filling as much as possible.

For a single track road a strip of 75 to 100 ft. wide is usual for level country; but where cuts or fills are made more than 10 ft. in vertical dimension, this is increased by 25 ft. for each 2 ft. over 10 ft. Where land cannot be bought on fair terms, the right of eminent domain conferred on the railroad by its charter secured from the State, which carries with it the right of condemnation proceedings, is employed, and the necessary land is obtained at a fair valuation of the damages to the land

owner. On the high grade railroad the width of the roadbed at sub-grade is set at 20 ft. for a single-track line. For double track, modern practice is to allow 13 ft. from center to center of the two tracks, making a total width at sub-grade of 33 ft. In building a new railroad the cross-ties are roughly laid down on top of the sub-grade and the rails bolted and spiked, forming a rough and imperfect track, which, however, is suitable for the passage of work trains at slow speed. Ballast is then distributed over the sub-grade by special dump or ballast cars and shoveled and tamped under the ties. The track is then given additional lifts until the ballast is distributed uniformly and firmly with a depth of 12 inches or more below the bottom of the tie.

*Ties.*—Timber cross-ties are universally used on the railroads of the United States. Oak and pine ties now generally predominate. white oak, when available, being especially desirable because of its hardness, elasticity and resistance to rot. Pine ties, because of their greater availability, have come into substantially increased use in recent years. They are found quite satisfactory when properly preserved against rotting by special treatment and against mechanical wear by the use of tie-plates.

*Rail.*—The form of rail used universally for railroad service in the United States is the T-rail, made to standard specifications of the American Society of Civil Engineers or the American Railway Association and American Railway Engineering Association, although some roads have sections of their own. Formerly rails were rolled in lengths of 33 ft., but in recent years 39 ft. has been adopted as standard on most railroads, and one trunk-line railroad is now experimenting with 66-ft. rail. *Rail Joints.*—The simplest form of joint is the common fish plate or angle bar, held to the rails by four or six bolts. Joints may be supported or suspended. In the supported joint the rail ends rest on a joint tie; in the suspended joint, used by most roads the rail ends project beyond the shoulder ties and are supported entirely by the splice bars.

*Gauge.*—The standard gauge of railroad track in the United States, *i.e.*, the distance between the inside of the heads of the rails, is 4 ft. 8½ in. *Switches.*—Where one line of rails diverges from another, as at a turnout, a switch and its accompanying frog are provided to control the direction of passing trains over the main line or straight track or onto the diverging line. Switches are called facing-

point switches if the train passes over the switch points before passing the frog, and trailing-point switches if the train passes the frog before the switch points.

**Grades.**—The grade, or rate of ascent or descent, may be expressed in the number of feet of rise to the mile or, preferably, as a per cent. Thus, a grade rising 1 ft. in 100 ft. measured along the track is a 1 per cent. grade or 52.8 per mile. Two per cent. is considered a heavy grade, although some of the best railroads of the country, operating through the Alleghenies or the Rockies, have overcome short distances of grades of 2.5 per cent. or more by means of reducing the train load or using helper engines. Grades as high as 4 or 5 per cent. can be operated with the usual type of locomotive, hauling greatly reduced loads. For steeper grades geared locomotives or rack railroads are employed. There are several such rack railroads in the Andes regions of Chile climbing grades as high as 6 per cent.

**Curves.**—Changes in the direction of a railroad line are made by joining the tangents with a curve. The curves are arcs of a circle for the greater part of their length, tapering off to the tangents by transition curves, as explained below. Curves may be simple, compound, or reverse. They are designated as to their sharpness by the number of circular degrees subtended at the center by an arc in the center line of track whose chord is 100 ft. long. A train in rounding a curve tends to lean outwards, due to centrifugal force acting on the center of gravity of each car above the rails or point of support. To overcome this, the outer rail is elevated, causing the train to cant inward. A common rule is to elevate the outer rail  $\frac{3}{4}$  in. per degree of curvature and add  $\frac{3}{4}$  in., the maximum in any case to be 6 in.

**Tunnels.**—Tunnels are principally confined to mountain roads, where their use may save many miles of detours or an appreciable saving in the length and steepness of grade required to cross a mountain range. An open cut is preferable if economically feasible. In hard, firm rock tunnels are not lined, but in soft loose rock or earth it is necessary to line them with some permanent structure. Brick or stone masonry or concrete is used. At the present time the longest railroad tunnel in the United States is the Cascade Tunnel used by the Great Northern in crossing the Cascade Range in the State of Washington. It is about 7.78 miles long. The electrically operated and recently enlarged Hoosac Tunnel of the Bos-

ton & Maine in Western Massachusetts, 4 $\frac{3}{4}$  miles, was until recently the longest tunnel in the United States and is still the longest double-track tunnel. The longest tunnel in the world is the Simplon Tunnel in the Alps, which is 12 $\frac{1}{2}$  miles long.

In recent years a number of under-water tunnels have been built for railroad service. The most noteworthy are those of the Pennsylvania Railroad, built in connection with that company's big passenger terminal development at New York. These are six in number—two under the Hudson or North River between New Jersey and Manhattan and four under the East River, connecting with the yards on Long Island and giving the Long Island Railroad, a subsidiary of the Pennsylvania, its entrance into the Pennsylvania terminal. Prior to the construction of these tunnels the Pennsylvania carried its traffic into New York by means of ferry boats. Another tunnel of importance is that of the Michigan Central (now New York Central) at Detroit. The building of this tunnel overcame the necessity of using a car ferry. All of the trains through these several subaqueous tunnels are electrically operated. (See TUNNELS AND TUNNELING.)

**Bridges.**—One of the most noteworthy tendencies of railroad development in the United States for many years has been the rapid replacement of timber or masonry bridge structures by concrete or steel in consequence of the use of larger locomotives and heavier cars. For small openings reinforced concrete, corrugated iron pipe or tile drains are put in and for brooks or small creeks larger openings, girder spans, cantilever or steel arch structures are used or possibly slab or arch concrete bridges, depending upon the conditions to be met.

**Freight Cars.**—The distinguishing feature of the freight cars used on the railroads of the United States and Canada is their high capacity and the tendency towards the use of cars of still larger capacity. The ordinary box car has a capacity of 40 to 55 tons and the ordinary coal car of 50 to 55 tons. Large numbers of coal and ore cars of 70, 75 and even 100 tons capacity have been built, and the roads serving the West Virginia coal districts have cars of 120 tons capacity. The American freight car is usually mounted on two swivelling four-wheel trucks or bogies. American freight cars are divided into the following principal classes: box or covered cars; gondola cars, having sides but no



roof; hopper cars for carrying ore or coal, having sloping floors with drop bottom doors to permit their unloading by gravity; flat cars; refrigerator cars; and tank cars. Refrigerator cars are used for transporting perishable fruits and vegetables, meats, produce, etc. They resemble an ordinary box car in appearance, but are built with thick insulated sides, floor, roof, and ends to retain a low temperature inside, ordinarily about 40° F. Ice boxes, which are filled through trap doors in the roof, are built in each end. A mixture of ice and salt is used, and particular attention is given to obtaining a free and constant circulation of cold dry air throughout the interior of the car. Experiments are now being conducted with chemical or mechanical freight car refrigeration.

The Safety Appliance Act, passed by Congress in 1893 and subsequently revised, requires all cars used in interstate traffic to be equipped with automatic couplers, standard hand holds, grab irons, ladders, etc. The movement of cars from one road to another is further covered by the Code of Car Service Rules of the American Railway Association, administered by a Car Service Division with headquarters at Washington.

*Passenger Cars* include all cars used in trains carrying passengers, namely, day coaches, parlor cars, sleeping cars, dining cars, baggage cars, express cars, mail cars, and combination cars carrying passengers and baggage or mail. The modern day coach is about 70 ft. long, and seats from 77 to 88 passengers. Such cars were formerly mounted on two four-wheel trucks, but the tendency on most roads to-day is to mount only cars for suburban service on four-wheel trucks and to use six-wheel trucks under the cars for through service. The Pennsylvania Railroad is a notable exception. Six-wheel trucks are almost exclusively used under parlor, sleeping, and dining cars. The large portion of passenger cars on through trains are now of all-steel construction and practically no new passenger cars of wooden construction are being built. The all-aluminum car was introduced in 1934.

*Pullman Cars.*—On most American railroads the parlor and sleeping cars attached to the important through trains are owned and operated not by the railroads, but by the Pullman Company, and are commonly known as Pullman cars. The only large North American roads that now operate their own parlor and sleeping car service are the

Canadian Pacific and Canadian National. The Pullman Company has its own porters and conductors and itself takes care of all work inside the car, such as cleaning, disinfection, etc. The Pullman Company is also obligated to furnish all the cars required, and this constitutes one of the chief advantages of the Pullman service from the railroad's point of view.

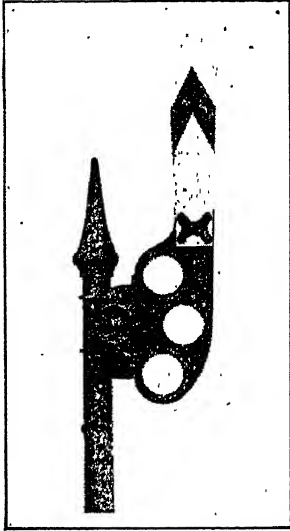
The ordinary *passenger cars on European railroads* are usually much shorter than the American cars. They are, as a general thing, divided into a few compartments or coupés, each accommodating several passengers. These compartments are entered directly through a side door or from a corridor, which extends along one side of the car. Cars on the American plan are now coming into use on the European railways.

*Freight Yards and Terminals.*—Freight yards and terminals are roughly divided into two classes: (1) those for classifying cars *en route*, and (2) those related to the receiving and delivery of freight. A classification yard is defined as a machine for separating trains or drafts of cars in groups according to destinations, routes, commodities, or traffic requirements, so as to accomplish their movement to tracks for these purposes. Such yards are found at division points along the line and on the outskirts of large communities, where land is not unduly expensive and where there is room for expansion. Terminals and yards for receiving and delivering freight include inbound and outbound freight houses, where the consignments are turned over to or received from the shipper and loaded on to or unloaded from the cars. Such terminals are found nearer the center of the industrial community, which adds greatly to their cost.

*Passenger Stations* range from the mere shelter at a flag station to the enormous terminals in the large cities. The 'city-gates,' as these larger terminals are often called, are sometimes exceedingly expensive. The tendency, however, is not to economize in their construction, and the larger proportion of them are models of modern architecture. The Grand Central and Pennsylvania Stations in New York City, the Union Stations at Kansas City, Washington, and Chicago, and the new stations at Buffalo, Cleveland and Philadelphia may be named among many especially notable in this regard.

Electric traction for railway trains, after having made limited progress for a long period of years, has recently taken a sudden spurt. At the present time, the New York

Central operates with electric locomotives and multiple unit cars out of its Grand Central terminal in New York, and the New York, New Haven, & Hartford similarly and as far as New Haven, a distance of 70 m. The Penn-



*Semaphore Signal at Proceed.*

sylvania, a pioneer in this field, operates many miles of its vast system by electricity, using both electric locomotives and multiple unit trains; while the Long Island, using the same station for its business to Long Island, uses multiple unit trains, operating over 139 miles. The Chicago, Milwaukee, St. Paul & Pacific is the leading example of trunk-line electrification, operating 682 m. of transcontinental line.

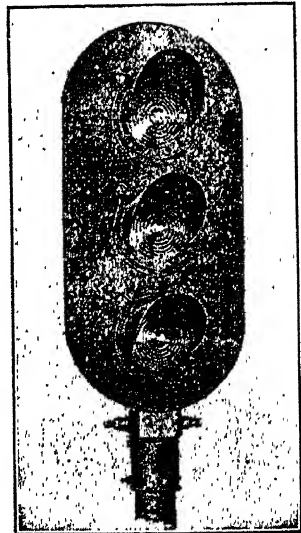
In order to run a number of trains safely over a single piece of track, either in the same direction or in opposite directions, some method must be adopted for keeping the trains either a fixed *distance* apart or a fixed *time* apart. The latter is at best a substitute for the former, yet it has been the characteristic system in use in the United States. It is called the *train-order* system in distinction from the former, or *block* system.

**Train-order System.**—At some central point on the road is located a train dispatcher, who is in telegraphic communication with all important stations along the line. A schedule of all regular trains is made out, giving the leaving time, time of passing each station along the route, and, if it be a single-track road with trains running in both

directions, the fixed meeting points, which are arranged to give a minimum delay to all trains. Each employee concerned is provided with a copy of this schedule or operating time-table, and trains are operated in accordance with it.

**Automatic Block Signals.**—These are in more extensive use in the United States than elsewhere and their use is increasing rapidly.

In the automatic signal installation, the two rails are insulated from each other and at the ends of the blocks are insulated from the rails of the adjoining block. An electric battery at the outgoing end supplies current which flows through one rail to the entering end, thence through a magnet of a relay controlling the movement of the signal at that point and back through the other rail to the battery. With the current flowing thus the signal is held in a clear or proceed position. When a train enters the block, however, the current in the rails, tending to take the path of least resistance, which is through the wheels and axles of the train, is short circuited from the relay. This short circuiting de-energizes the signal relay magnet and allows the relay magnet to drop, causing the signal to fall to a horizontal or stop position.



*Color Light Signal.*

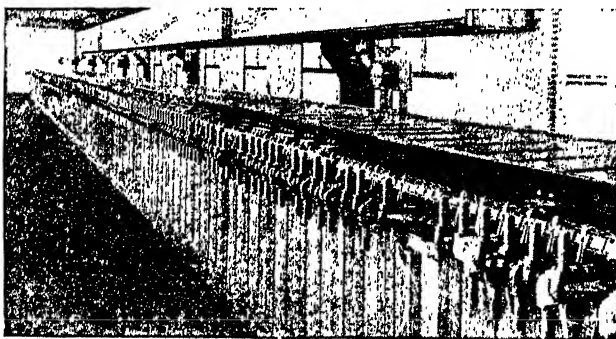
tion behind the train. The signal arm is counterbalanced to assure its falling to a natural horizontal position, or, in other words, power is required to move or to hold it in any other position. Thus, if any ob-

struction is on the track or a rail is broken, the current is broken or ceases to flow through the relay magnet and the signal goes to 'stop' the same as if a train was in the block.

The ordinary type of signal used in automatic block signaling was formerly the semaphore. This gives indications by its position. The blade of arm is about 4 ft. long and 8 inches wide. It is pivoted at one end and is carried on a post about 20 ft. above the rails to the right of, or on, a signal bridge over the track it controls. The pivot carries a counterweight or spectacle casting in which red, yellow and green lenses are mounted and behind which is placed a lamp for giving night indications. The arm moves in either the upper or lower right-hand quadrant. When the blade is in

or in thick weather. In most cases in such installations colored lights are used as in ordinary street traffic signals.

Interlocking signals, at junctions and cross-overs, are those which are made to work in connection with the shifting parts of railroad track, such as moveable frogs and switches. They are so arranged that, first, no train shall proceed until all of the tracks and movable parts have been placed in their proper positions; second, no train shall proceed until all other trains which might collide with it have been warned to stop; third, none of the shifting parts of the track can be moved so long as a signal gives an indication to proceed. Power locking, in its essential principles, is similar to the manual or mechanical interlocking described above. The



*Courtesy General Railway Signal Co.*

*Electric Interlocking Plant at Cleveland Union Terminal.*

the horizontal position the signal shows red at night and indicates stop. If moving in the upper quadrant when vertical or if in the lower quadrant, when at the lowest position the blade gives a clear indication and the light shows green. The middle position in the upper quadrant indicates caution and shows a yellow light. With lower quadrant signals a separate arm is used for the caution indication. The movement of the arm to the caution or proceed position, as controlled by the track circuit relay above described, is effected by a motor, actuated usually by current from storage batteries sunk in a well at the foot of the signal post. Movement to the horizontal or stop-position is by gravity. In recent installations or replacements, the tendency has been to replace the semaphores by light signals. These use strong lights and reflectors of sufficient power to be visible in the brightest sunlight. Such signals give much clearer indications, especially at night

locking features of the machine are much the same, but, in place of the manual levers connected to the signals and switches by wires and pipes, electric control is used, the signals and switches being controlled by electric current in either case but actuated by compressed air in the electric-pneumatic system and by electric motors in the all-electric system. Several interesting adaptations of interlocking, particularly in relation to automatic block signals, have been introduced in recent years. One is the automatic interlocking system used for a crossing of one road by another at a point where the number of trains is limited. By means of crack circuits, a train moving to the crossing moves the signals to clear on its own track if the other track is not occupied, and moves across the crossing protected by the stop signals on the other track. Remote power switches have rapidly come into more general use. These are switches located possibly several miles from

the tower or control point; they are electrically controlled and their use permits the tower-man to operate a switch and give proper signal indications so that an engine-man may be instructed to enter a passing track and allowed to do so without stopping and without the necessity of train orders or other instruction. Two-direction signalling has been installed on many roads. Applied to a double, three or four track line, it may be used to permit the movement of trains on any track in either direction. Thus, by using both tracks of a double-track line for a few minutes for northbound traffic, a passenger train may be run around a slow-moving freight train without requiring the freight train to stop and wait on a siding for the passenger train to pass. At a busy terminal served by four tracks it is possible to use three or even four tracks for inbound trains in the morning and three or four for outbound trains in the evening. Such possibilities have been found in many instances to represent vast savings in capital expenditure by avoiding the necessity of adding trackage.

The block signal system is not an absolute preventive of accidents, since an engineman may sometimes take a chance and run by a stop signal or his mind may fail to register the signal indication. Accidents caused in this way have developed an agitation in favor of the automatic stop or of automatic train control. Such an arrangement has been installed on the subway lines in New York, the elevated and subway lines in Boston, and other rapid transit lines, the first permanent installation having been made on the Boston Elevated in 1899. Each home signal has connected with it, alongside of the track, a tripper, which is thrown up when the signal indicates stop and is down at all other times. When up, the trigger engages the projecting handle of a valve mounted on the car trucks, and if a train passes the signal at the stop position the valve on the train is opened, applying the air brakes automatically and bringing the train to rest in a short distance.

*Speed.*—The speeds of railroad passenger trains have over an extended period of years shown relatively little change, the tendency having been rather to cut down excessive speed in the interest of safety. In recent years, however, in consequence of the effort to make railroad passenger travel more attractive, the time of limited trains has been reduced, the result having been largely brought about by elimination of delay as

much as by increased speed on the road. The year 1934 marked the introduction of streamlined aluminum trains, which afforded comfort in riding and at the same time were capable of attaining a speed of 120 m. an hour. In 1933 the speed of freight trains advanced to 15.7 m. an hour.

*Railroad Management.*—The form of the various railroad organizations has become fairly well standardized, on the whole, on the same general plan. The railroad receives its charter from the State; inasmuch as it is a corporation, it has possibly a chairman of the board of directors and certainly a president. The latter reports to a board of directors and through them to the stockholders. The directors, beside choosing the president, elect the vice-presidents, the secretary, treasurer, comptroller, and the general counsel. The operating department is charged with getting the trains over the road and, in general, of conducting the transportation service. On most roads it is also charged with providing and maintaining the roadway and structures and the cars and locomotives. It is usually under the direction of a general manager. To facilitate efficient operation, the road is divided into divisions each in charge of a superintendent, who is responsible for the operation of the 100 m. or so of main line and the related branches under his jurisdiction. The engineering or maintenance department is represented on the division by the division engineer; its head is the chief engineer. This department is responsible for the construction of new roadbeds, buildings, and structures, the installation of new bridges, signals, etc., and for their maintenance. The mechanical department is represented on the division by the master mechanic, and is headed by the general superintendent of motive power. It maintains the cars and locomotives and is in charge of the round-houses where the locomotives are turned, inspected and repaired, and of the shops where the motive power and rolling stock are given more important repairs.

Two main plans of correlating the work of the engineering and mechanical departments with that of the operating department have been worked out—the divisional and departmental. Under the former, which is the more common, the division superintendent has charge of all three branches of the work on his division, transportation, maintenance, and mechanical. In the departmental scheme of operation the work of each of the three branches of operation is divided territorially,

a separate officer, responsible only to the head of his particular department, being in charge of the work on a division. The departmental plan of organization is in common use in England. The New York Central is one of the few roads using it in America.

The traffic department may be in charge of a vice-president in charge of traffic or of a general traffic manager. Its work is divided into two parts—passenger and freight. These respective departments may be in charge of freight and passenger traffic managers or of general freight and passenger agents. Most roads have also a general purchasing department. There may also be found a real estate department, relief department and as an adjunct to the engineering department, a valuation department.

*Railroad Consolidation.*—The consolidation of railroads has frequently been a subject of governmental or public concern. The Sherman Act, passed in 1890, intended to prevent the formation of 'trusts' operating in restraint of trade, was early made to apply to railroads. Indeed, one of the most famous cases fought under the Act was the Northern Securities case of 1902 in which a United States Supreme Court decision required the severance of common control of the Northern Pacific by the Great Northern and the Union Pacific. This decision, particularly as amplified by the Clayton Act of 1914, which has elaborate provisions relating to railroads, proved an effective damper on railroad consolidations. The Transportation Act of 1920, however, gave voice to a more liberal viewpoint. Provisions were included in it intended to encourage the voluntary consolidation of railroads. The effect desired was a limited number of systems of approximately equal earning power so arranged as to assure, insofar as possible the maintenance of former routes of traffic and competition of service. Under the terms of the Act, differentiation was made between consolidations effected by merger of corporate identity on the one hand, and acquisition by lease, by purchase of stock, or by operating agreement, on the other. In December, 1929, the Commission published its final plan calling for the creation of 19 systems, or 12, including the United States mileage of the Canadian lines. For later history, see UNITED STATES HISTORY.

*Railroad Rates.*—Under the terms of the Interstate Commerce Act, as amended by the Transportation Act of 1920, the fixing of the general level of freight rates and passen-

ger fares is in the hands of the Interstate Commerce Commission rather than of the traffic departments of the railroads. The Interstate Commerce Commission is required to establish a level of rates which will yield a fair return upon the aggregate value of the railway property held for and used in the service of transportation. The Commission, besides having jurisdiction over the general level of rates, also has the power of reviewing or prescribing rate relationships and even individual rates.

*Freight Traffic and Rates.*—The transportation of freight is much the most important function of American railroads. On only a very few roads of any importance, such as the New York, New Haven & Hartford, and the Long Island, do the receipts from passenger traffic even approximate the receipts from freight traffic. In 1939 operating revenues totaled \$3,995,004,000, of which \$3,244,445,000 was from freight. The adjustment of freight rates is far more complicated than that of passenger fares. Whether it pays better to carry a small amount of freight at a high rate or a larger amount at a low rate can be determined only through experimentation with each item of freight. Each item must yield at least enough to cover the additional expense to the company arising from the haulage of that particular freight. At the same time the freight rate must not be so high as to handicap the producer in competition with producers served by other means of transportation. With freight of low value per unit of bulk, the volume will usually expand markedly under conditions of cheap transportation. A very moderate rate per ton per mile will prevent coal from being carried 500 m. from the pit; an equal rate on silk goods represents a negligible increase in the value of such goods. High-grade goods may bear a far higher rate than low-grade goods without appreciable diminution in the amount offered for carriage. In American policy, accordingly, rates are graduated roughly in proportion to the value of the goods carried, the lowest-grade goods often barely paying the cost of carriage, while the high-grade goods pay in addition a part of the fixed charges, and presumably something toward net profits. The policy of graduating rates according to the value of the commodities, and making such rates as will move any given traffic, has been one of the chief causes of the extraordinary development of the freight business of the American railroads, and of the marked re-

duction in average rates. When worked out properly, it has enabled new centers of industry situated at favorable points to compete with older centers and thus has contributed to extending the country's industrial and agricultural development. Where a railroad carries goods between two points which are also connected by water-transportation lines, or by rival railroads, freight rates must be so adjusted as not to drive business into the hands of the competing carriers. High-grade goods, which might be well able to pay a high rate, may have to be given a rate yielding little above the expense of moving. In the earlier days, each carrier, in its zeal to extend business offered concessions to shippers, which were met by counter-concessions from the competing routes. While this tendency to reduce rates was checked to some extent by agreements among the competing carriers, the through rates between competitive centers are still ordinarily less, in proportion to distance, than the rates from either center to non-competitive, intermediate points. Such relationships in favor of the competitive center tended naturally to build up the business of such centers at the expense of the intermediate points, and constituted one of the chief sources of complaint against American railroad rate making. This matter is now in the hands of the Interstate Commerce Commission and the charging of lower rates to a competitive center than to intermediate points *en route* can be done only with the Commission's permission and only in exceptional cases.

In former years, where an individual shipper was so situated that he might send his goods over either of two competing lines, he may have secured from one of the roads a rate more favorable than that accorded to his competitors who enjoyed no such option, especially if his shipments were large. The agents of each road were anxious to secure the business, at scheduled rates if possible; if this was not possible, at rates slightly lower. Discriminations of this nature were exceedingly common in the United States down to 1905 and were known as rebates. With more stringent regulation, however, this practice has long since come to an end.

Under government operation of railroads, and to a lesser extent under government regulation, there appears to be more of a disposition to fix rates according to a cost basis, reckoned according to mileage and terminal costs. Under government ownership, also,

there is a disposition to inject political objects into railroad policy.

*Passenger Traffic and Rates.*—The fares which a railroad may charge for the carriage of passengers, like the rates for freight, are placed by the Interstate Commerce Act under the jurisdiction of the Interstate Commerce Commission. Prior to the Great War the average fare for ordinary local passenger journeys was slightly over 2 cents a mile, though many States had enacted laws limiting fares to 2 cents a mile. During the war, passenger fares were raised by the Director-General of Railroads, and in August, 1920, under the terms of the new Transportation Act they were again increased 20 per cent. by the Interstate Commerce Commission. For local journeys they came to aggregate about  $3\frac{1}{2}$  cents a mile, (since lowered).

The general level of passenger fares, like that of freight rates, is a matter of adjustment brought about through many years of competition and development. Roads having longer routes between competitive cities met the rates of the shorter lines, and in general there were much rate-cutting and unpleasantness. The disastrous effect of so much competition has led to the formation of agreements and adjustments to cover such matters, and has resulted in the working out of a definite structure of passenger fare relationships. New problems have been offered to the railroads in recent years in consequence of the loss of business to the automobile. It has, in general, been found that the greatest loss in railway passenger business has been in the local or medium distance travel. Special attention has been devoted to attracting the patronage of the long-distance traveller through faster schedules, otherwise improved service or new equipment. The falling off in local travel has, on the contrary, resulted in curtailment of service and, in many instances, the substitution of highway buses, which it has been found can be operated much more cheaply than steam train service.

*Government Regulation.*—Public service, public utility or railroad commissions are now in existence in every State of the Union. They vary in size from three to seven members, serving from two to ten years; they are elective in some States and appointive in others, and the utilities to which their jurisdiction extends vary widely. In addition to exercising general powers of investigation and supervision over the conduct and practices of railroads, they are authorized to reg-

ulate franchises, prescribe rates, prevent discrimination, regulate accounts and reports, and in a number of States to supervise the issue of stocks and bonds. The commission may invoke judicial processes for the enforcement of its orders, and its decisions are, of course, subject to review by the State courts in case complaint arises that rates prescribed are unduly low, and therefore confiscatory. The tendency in recent years has been for the Interstate Commerce Commission to gain in power and control at the expense of the State Commissions, a development which has been considerably accentuated by the Transportation Act of 1920.

*Other Countries.*—Railroads in Great Britain are privately operated, subject to a general system of government supervision much less elaborate than that of Interstate Commerce Commission control in the United States. The major railroad systems number only five in number, there having been a compulsory consolidation of the British railways shortly after the war. These five systems are permitted to earn net income equivalent to that earned in the year 1913, which is taken as a base because it was the last normal year before the war and because it was a year of fairly good earnings. Rate matters are determined by the Railway Rates Tribunal composed of representatives of the railroads, the shippers and the government.

In *France* both the construction and operation of private railroads are under the strict surveillance of the Minister of Public Works, who has extensive powers of control over all matters of public safety and over the commercial and industrial features of railway development. While he may not himself fix rates, all rates are subject to his approval. The actual details of control are carried out by the several departments of the Ministry of Public Works.

In *Canada* a regulative control over both the 22,500 miles of Dominion-owned 'Canadian National Railways,' operated as a Company with a Board of Directors appointed by the Federal Government, and the privately owned railways of about equal length is vested in the Canadian Railway Commission, established in 1903.

*Government Ownership* of railroads has attracted wide-spread attention in the past 50 years. Before the Great War, in the countries of Continental Europe, it had largely supplanted the older policy of private ownership and operation under governmental regulation and in Great Britain and the

United States, it has been seriously agitated as a practical solution of the railroad problem, and during the Great War government operation of the privately owned lines was undertaken as a military measure.

The adoption of government ownership of railroads is due to various causes. The determining factor in the case of Prussia and the other German states was military necessity, although the advantages of a unified railroad system and a hesitancy of private capital were given due weight, and similar reasons led to the policy of state railroads in Russia, Austria, and Hungary. In Italy, Belgium, and other of the European countries, the difficulty of creating private companies with sufficient capital to undertake the construction of railroads, and indisposition on the part of the government to leave the field to foreign capitalists, played an important part in the introduction of the policy. The same lack of private capital and private enterprise is mainly responsible for public ownership in Australia, South Africa, and in those cases where it exists in Spanish America, though in the case of the Australian states, as also in Switzerland, an important factor was the popular belief that under public ownership the roads would be made better to subserve public interests.

*Belgium* was the pioneer country in the adoption of government construction and ownership of railroads, Leopold I. having initiated the policy shortly after the country had won its independence of Holland.

In *Germany* state railway development dated from the end of the Franco-Prussian War and the formation of the Empire.

In *Switzerland* governmental regulation was first exercised by the cantons, and was later transferred to the Federal government. A referendum taken in 1898 provided for the purchase of all the lines by the state. In 1860, when *Italy* became a kingdom, some of the railroads were publicly and some privately owned. By 1875 three-fifths of the mileage had been taken over by the state, but, state operation having proved unsatisfactory, the lines were leased in 1885 to private companies under a plan whereby earnings and expenses were shared and provision was made for repurchase by the state. After a period of serious mismanagement and poor service the lines were taken back by the government in 1905.

The agitation in favor of government ownership in the *United States* has been of long standing and was evident in particularly

strong fashion during the war. The opinion of the country, however, was shown to be decidedly in favor of private ownership and control. A proposal to extend even the war-time government control of railways for a period of five years, while it was given a great deal of attention, hardly received serious consideration. A plan for government ownership of the railways in the interest of the employees—the Plumb plan—met with like treatment.

*Government Control* is to be distinguished from government regulation and from government ownership alike. Under government regulation the railroads are operated by their owners under certain rules and regulations established by a governmental authority represented by a commission; under government ownership they are both owned and operated by the state. Government control is primarily a special expedient for use in an emergency such as a war. Under it control of railroad operation is exercised by the state, which usually guarantees to the owners average earnings based on a determined preceding period. Upon the entrance of the United States into the Great War, the operation of the railroads of the country was co-ordinated in the hands of a committee of executives known as the Railroads War Board, of which Fairfax Harrison, president of the Southern Railway, was the head. On December 26, 1917, acting under the authority conferred upon him by provisions of Army Appropriation Act of August 29, 1916, also known as the Federal Operation and Control Act, President Wilson issued a proclamation placing the transportation system of the country under government operation and control.

William G. McAdoo, Secretary of the Treasury, was designated Director-General of Railroads, with authority to enter upon negotiations with the railway companies, looking to agreement for 'just and reasonable compensation for the possession, use, and control of the respective properties on the basis of an annual guaranteed compensation above accruing depreciation and the maintenance of their properties, equivalent, as nearly as may be, to the average of the net operating income thereof for the three-year period ending June 30, 1917. Mr. McAdoo, as Director-General of Railroads, promptly took steps to create an organization to coordinate and carry on the operation of the roads, and through the possession of powers not in the hands of the Railroad

War Board, was able to bring order out of the chaos of the congestion. He put the priority privileges on a more sensible basis and was able, by coordinating the operation of terminals, shipping over the shortest routes, and making various lines specialize on certain kinds of traffic, to help matters considerably. Railroad employees had been demanding a readjustment of wages because of the war-time increase in the cost of living. The Railroad Wage Commission, appointed to make recommendations on this subject, reported in May that increases were necessary, and its recommendations were embodied in General Order No. 27 and various supplements thereto, giving general increases to employees in all classes of service. To provide for this general increase, a general advance of 25 per cent. was made in freight rates, and passenger fares were raised to 3 cents a mile.

Director-General McAdoo resigned on January 1, 1919, and was succeeded by Walker D. Hines, who had been Assistant Director-General. Mr. Hines was confronted during his term as the head of the Railroad Administration with constantly increasing costs, it having been found that the expected savings from coordinated operation failed to materialize in anything like the degree looked for. He essayed to compensate for this handicap by an appropriation from Congress, which he secured only after much debate and delay and then in reduced amount. No increase in rates was made, however, with the result that the year 1919 was a period of retrogression rather than of progression. Improvement and even maintenance work was held to a minimum; no new equipment was purchased, and in twenty-six months of government control only one-half as many new cars and locomotives were added as should properly be added in a single year. The result was that the railroads were returned to their owners on March 1, 1920, in great need of rehabilitation. To cover the period of transition Congress in the Transportation Act permitted the railroads to accept, if they desired, a continuation to September 1, 1929, of the annual compensation or standard return.

*Railroads and Labor.*—Prior to the organization of the four great railway brotherhoods there were no limitations upon the hours of service of railway trainmen; mileage was the sole basis of pay; and no allowance was made for overtime. Through the efforts of these organizations, however, wage



increases were secured from time to time, a twelve-hour day, later a ten-hour day, and eventually assisted by legislation, an eight-hour day was established. The eight-hour day was established by the Adamson Eight-Hour Law of 1916 which was upheld by the United States Supreme Court in 1917. As now worked out in accordance with this act and with the wage agreements between the railroads and the train-service brotherhoods freight train-crew wages are paid on a basis of a standard eight-hour day of 100 miles with punitive wage payments of time and one-half for overtime.

Machinery for the arbitration of railroad labor disputes has been provided for by Congressional action. Laws of 1887 and 1888 authorized the selection of three arbitrators by the railroad companies and their employees to act in controversies arising between carriers and their employees engaged in interstate traffic. This power was never utilized, and the acts were succeeded by the Erdmann Act of 1898, amended in 1911, and again in 1913, in the latter year by the Newlands Act, which provides for the creation of a permanent Board of Mediation and Conciliation and for arbitration, when required, by arbitrators representing both parties to the controversy. The most ambitious legislation relating to arbitration, and in general to the relations of the railroads with their employees was, however, contained in provisions of the Transportation Act of 1920, providing for the creation of the Railroad Labor Board. This was to have nine members. It was intended to decide railroad labor matters in much the same manner as the Interstate Commerce Commission was to deal with railroad rates or other phases of regulation. It did assist in solving the railroad labor problems following the return of the railroads to private control in 1920, but dissatisfaction with its activity both on the part of the railroads and the unions resulted in its abolition in May, 1926 and the substitution thereof of the arbitration methods provided in the Railway Labor Act passed at that time. In this act the railroads and employees are admonished to exert every reasonable effort to make and maintain agreements concerning rates of pay, hours of labor or working conditions and to settle disputes as expeditiously as possible to avoid interruptions of service. In case of disagreement the carrier and its employees are required to confer in the effort to arrive at settlement of the dispute. However, should

such conference be unavailing it is provided that the matters at issue shall be referred in detail to an adjustment board.

In case such a board should fail to arrive at a decision a further means of appeal is provided to a board of arbitration of three (or six) members, one member to be chosen by the carrier, and one by the employees, these two to select the third. In case the two arbitrators fail to agree on the third arbitrator, the latter may be chosen by the Board of Mediation. The Board of Mediation is a permanent organization of five members appointed by the President of the United States, having permanent headquarters at Washington, but being empowered to meet elsewhere if desirable. On the whole, relations between the railroads and labor in the United States have been marked by few disturbances of great extent.

Shortly after the return of the railroads to private control, on March 1, 1920, an agitation was started by the employees for increased wages to compensate for increased living costs at that time. Sporadic strikes occurred among various of the lesser paid crafts—shopmen, firemen, brakemen, etc.—and for a time railroad traffic practically ceased on many lines, resulting in unprecedented congestion at a time of exceedingly great business activity. As soon as the new Railroad Labor Board was appointed and could act on the case, it granted increased wages, issuing its decision in May and making the increases retroactive to January 1. Other serious labor difficulties developed in 1922 in the strike of the railroad shop forces. Service on many railroads came almost to a standstill for several days and there was much violence. An injunction against this violence was granted by the Federal court.

In 1943 U. S. railroads, still in the hands of their owners, were cooperating with one another and with the Government in the movement of troops and war supplies. The recent history of railroads and labor will be found under UNITED STATES HISTORY.

The most valuable collection of facts relating to the general management of the United States railroads and their relations to the public is found in the *Annual Reports* of the Interstate Commerce Commission and in its volumes giving the *Decisions* of that body and the *Annual Statistics of Railways*.

Consult also the *Bulletins* of the Bureau of Railway Economics, Emory R. Johnson and T. W. Van Metre's *Principles of Railroad Transportation* (1921); Ripley's *Rail-*

roads, Finance and Organization (1915); William T. Jackman's *Economics of Transportation* (1926); Stuart Daggett's *Principles of Inland Transportation* (1928); Ray Morris' *Railroad Administration* (1930).

**Railroad Worm, or Apple Maggot** (*Rhagoletis pomonella*), a small whitish maggot which is widely distributed throughout the United States but is especially injurious to the apple orchards of New England, Eastern New York, and Southeastern Canada. The fly, which is a little smaller than the house fly, with the abdomen banded with white and the wings with black, deposits her eggs beneath the skin of the apple, early varieties being most frequently chosen. The eggs thus deposited—12 to 15 in a single fruit—hatch after four or five days, and the small white maggots, with their hooklike mouth parts, burrow their way through the pulp, leaving a small brown track or tunnel. After they have completed their growth, they bore their way out of the fruit and enter the ground, where they remain during the winter, the adult fly emerging in July. The only measure for controlling this pest is to destroy the affected apples as fast as they drop to the ground.

**Railway Brotherhoods**, a name generally applied to the four largest and most important unions of American railroad employees, namely the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen and Enginemen, the Brotherhood of Railway Trainmen, and the Order of Railway Conductors. They are organized independently of the general union movement, as exemplified by the American Federation of Labor, and have certain common characteristics which distinguish them from other trade unions. Each of the orders includes practically all the men in its field, and each is countrywide in its jurisdiction; all deprecate the sympathetic strike and advocate the open shop, and all emphasize fraternal and benevolent features as well as wage schedules, hours of labor, gradations and promotions, and other questions with which labor organizations commonly deal. They lay special stress also upon the personal character and conduct of their members, and seek, so far as may be, to cultivate amicable relations between capital and labor.

Though, in common with other associations of wage-earners, the brotherhoods seek the most favorable conditions of employment for their members and occasionally expend large sums for strike purposes, they devote by

far the greater part of their revenues to the payment of death and disability insurance.

Other beneficiary features include employment bureaus, pension funds, funds for the care of dependents of deceased members, and a Home for Disabled Railroad Men, maintained jointly by the four organizations at Highland Park, Ill. Affiliated with each of the brotherhoods is a ladies' auxiliary.

The oldest of the railway brotherhoods is the Brotherhood of Locomotive Engineers, formed at Detroit, Aug. 17, 1863, and reorganized under its present name the year following. The Order of Railway Conductors, the second oldest national association of railway employees in the United States, was instituted at Mendota, Ill., July 6, 1868, by representatives from local unions at Amboy and Galesburg. The Brotherhood of Locomotive Firemen, next in age to the Conductors, was organized in 1873 at Port Jervis, N. Y. The Brotherhood of Railway Trainmen was organized in 1883, and includes conductors, baggagemen, brakemen, flagmen, and switchmen in train and yard service.

**Railways**, a term frequently used interchangeably with railroads. For the purposes of the present article it will be confined to Electric Railways, Mono-railways, Mountain Railways, and Military Railways. Electric Railways include trunk lines on which steam has been superseded by electricity, urban and interurban surface lines (see STREET RAILWAYS), and elevated and underground systems.

**Elevated and Underground Railways.**—The problem of metropolitan rapid transit has been largely met by means of overhead and underground railways. Such lines are intended almost wholly for the conveyance of passengers and, as compared with trunk lines, are characterized by shortness of length and a high initial cost per mile.

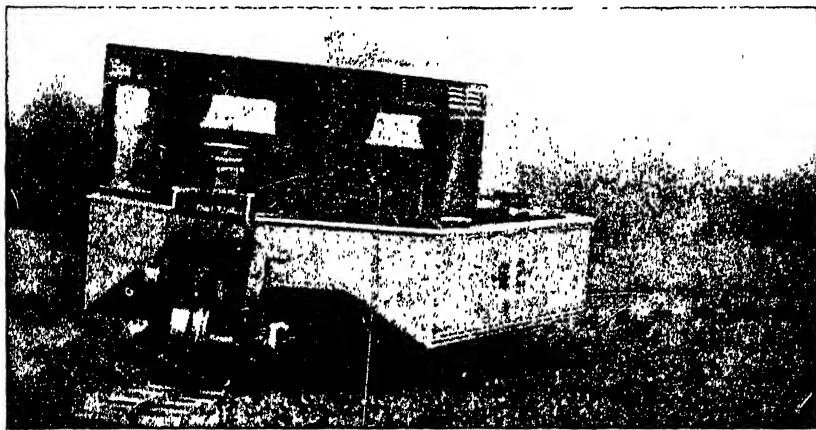
The first elevated railway was begun in New York City in 1867, and in 1871 regular service was commenced on the Ninth Avenue line, a three-car train drawn by a steam locomotive being run as far n. as 30th Street. The distance covered was three miles with no intermediate stops, there was a single track, the fare was ten cents, and 53,912 passengers were carried from April 9, when the road was opened, to Sept. 30. The venture having proved successful, the work of doubling the track and extending the line was actively carried forward, and by 1876 there was a double track from the Battery

to 61st Street with stations between. Other lines soon followed not only in New York but in Brooklyn, Jersey City, Chicago, Boston, and Philadelphia in the United States, and in Berlin and Liverpool.

The first underground railway was opened in London in 1853. In 1886 a tunnel  $3\frac{1}{2}$  m. long was bored for the City and South London Railway, and in 1893 an underground railway was built in Budapest. In the United States the first underground railway or subway was opened in Boston in 1897, the first New York subway was opened in 1904, and the combined elevated and underground system of Philadelphia in 1905. Both underground and elevated railroads may be divided into three classes: Those

pendent below it, and thus preserve their balance entirely by gravity; (2) those in which the vehicles are arranged pannierwise straddling the monorail, and the center of gravity more nearly approaches the top of the running rail; (3) those in which the center of gravity is entirely above the running rail; (4) those in which the center of gravity is above the rail and the balance is obtained by a gyroscope or a rapidly spinning flywheel on board the car.

Of the first system, the best known example is that of the suspended railway along the valley of the Wupper in Rhenish Prussia, from Elberfeld to Barmen. The line is  $8\frac{1}{4}$  miles long and proceeds partly through the main streets of the towns it traverses and



*The German Mono-Railway Car.*

for trains forming a system entirely independent of the means of conveyance on the surface of the street, as most of the New York lines; those for surface cars, in order to relieve congestion on crowded or narrow thoroughfares, as some of the Boston subways; and those for the purpose of crossing obstacles to continuous transit, as the tunnels under the East River in New York. (See SUBWAYS; TUNNELS).

Monorailways differ from the usual type of railway in that a single rail is used to support the weight of the car, although there may be additional guide rails. They have proved successful in mines and quarries, for handling material in factories, and, to a limited extent, for regular passenger traffic.

Monorailways may be roughly divided into four classes: (1) Those in which the center of gravity is entirely below the supporting rail, so that the vehicles hang sus-

partly suspended over the course of the river Wupper. In the second class of monorailways the vehicles are arranged in duplicate, one on each side of the support rail, on which the wheels run (tandemwise). The first railway of this type appears to have been laid in 1825 at Cheshunt in Hertfordshire, England, for the conveyance of bricks. A monorail system of this type was installed in 1910 on a short branch line of the New Haven Railroad running through Pelham Bay Park to City Island, in the Borough of the Bronx, New York City. The line was abandoned, however, after a limited period of use. Monorails of the third type are used extensively in sugar and coffee plantations, and form a very cheap and effective means of haulage of a temporary nature.

The fourth or gyroscopic class of monorailway depends on the tendency of a rapidly spinning heavy wheel to maintain the plane

of its motion, no matter what movement may be impressed on its support, a principle which has already been successfully used in vessels to prevent or minimize pitching and rolling, and in aircraft (see GYROSCOPE). Since 1907 many experiments have been made on this line. Somewhat extravagant claims have been made for the gyroscopic type of monorail by those who think that it is destined eventually to revolutionize traffic, and it has been predicted by some that the railway train of the future may be run on a loosely hung cable, even across deep gorges, doing away with all costly systems of constructions, embankments, bridges, and the like.

**Mountain Railways.**—Railways passing through mountainous districts constitute a special class on account of the steep gradients necessitated, the considerable heights which often must be surmounted in a limited distance, and the special dangers, such as avalanches, torrents, and landslips, which must be guarded against in construction. The rack railway is the commonest system where the gradient of the line is too steep to allow the load or train to be hauled up in the usual manner by self-propelled vehicles, such as steam-engines and electric motors, or to allow of loads being lowered by means of ordinary brakes attached to the running wheels of the train. On a bed of coarse gravel steel rails are laid on steel sleepers with the rack in the center of the line. This consists essentially of some form of rackwork or system of teeth, running longitudinally with the railway, into which cog wheels on the engine gear, thus providing a positive grip for these toothed driving wheels to which power can be applied for hauling up the loads, and powerful band brakes can be attached for lowering the load. On some lines, as the Gornegrat and the Jungfrau in the Alps, electricity is the motive power. Cable railways are used up to a maximum gradient of 650 in 1,000, the Beatenberg, Lugano, Stanzerhorn, and other Alpine lines being of this construction.

**Military Railways** may be classified as (1) those that are built and operated within the field of the enemy's observation and fire—combat railways; and (2) those that are built beyond the range of hostile observation and fire—supply lines.

Combat railways are practically always of narrow gauge and in most cases are of portable track similar to that used in mines and industrial works. They must be capable of

transporting guns, ammunition, and other supplies, as well as of bringing up reinforcements rapidly, conveying working parties to and from work, and removing sick and wounded to the rear. Supply railroads are constructed to convey troops and supplies from the base to the front in time of war, and to connect permanent camps with the nearest existing railway. They vary from a light portable track to a standard gauge line, the principal considerations in their construction being the amount of troops, supplies, and animals to be handled, the time available for construction, and the amount of transportation necessary to place supplies on the work. See also RAILROADS.

**Rain.** See **Rainfall**.

**Rainbow.** When the sun shines on falling rain, a rainbow, or arc of prismatic colors, is seen on the rain. The phenomenon is due to the combined effects of refraction and interference of the solar rays as they pass through the falling raindrops. The arc has a radius of from  $40^{\circ}$  to  $42\frac{1}{2}^{\circ}$ , and the colors are arranged in the order of the spectrum—red being outside, and then orange, yellow, green, blue, indigo, and violet. The purity of the color phenomena depends on the size and uniformity of the drops of rain. The amount of the circle visible at any moment is determined by the altitude of the sun. The ordinary or primary rainbow is caused by one reflection and two refractions of the rays of light from the inner surfaces of the raindrops and through them, while the secondary bow is occasioned by two reflections and two refractions.

**Rainbow Trout**, a richly colored Californian trout (*Salmo irideus*). It has been extensively acclimatized in the Eastern United States and elsewhere. It is also the name of the Rocky Mountain trout.

**Rain Crow**, an American tree cuckoo (genus *Coccyzus*), especially the Yellow Billed Cuckoo (*C. americanus*). It is supposed to foretell rain by its cries, heard in lowering weather.

**Raines, John** (1840-1909), American legislator, was born in Geneva, N. Y. He was a member of the New York assembly (1881-2 and 1885), a State senator (1886-9, 1894-1909), and a member of Congress (1889-93). He was the author of the New York liquor legislation known as the 'Raines Law,' which stipulated that liquor could be sold on Sundays in New York State only by licensed hotels containing at least ten bedrooms.

**Rainfall** is the water that is precipitated

from the atmosphere in either the liquid or solid condition. The quantity of water that can exist in the atmosphere as a vapor varies with the temperature. When the maximum amount of vapor for any given temperature is present, the vapor is said to be saturated; and if the air is cooled below the point of saturation, a part of the vapor is condensed, and will fall as rain. Precipitation is facilitated by the presence of nuclei on which the drops of water form. These nuclei of condensation may be minute solid or liquid particles, or even the ions resulting from the dissociation of atmospheric molecules. When condensation takes place below the freezing point, snow is formed. Snow, if melted, will yield in water, on the average, one-tenth of its original depth.

The cooling of air necessary for condensation may take place in the following ways: (1) by contact of the air with colder land or water surfaces; (2) by the radiation of heat into space or to the earth; (3) by the mixture of comparatively warm and moist air with that which is colder and drier; (4) by the cooling of air due to its own expansion when it passes into a region of lower atmospheric pressure, either as an ascending current due to the displacement of heated lower air by colder air from above, as a part of the revolving and ascending winds in an area of low barometric pressure, or by the more direct ascent when forced up a mountain slope. The last named process is very effective in the formation of clouds and rain, and the regions of heaviest rainfall are found where moisture-laden winds from the ocean are deflected upward by mountain ranges. It follows that the distribution of rainfall is largely influenced by the direction of the prevailing winds, the occurrence of cyclonic storms, the topography of the land surface, and the relation of land and water areas.

In summer the continents are hotter than the oceans, and the surface winds tend to blow from the sea to the land; in winter both of these conditions are reversed. The movement of the sun north and south of the equator causes a corresponding north and south periodic shift of the wind belts and temperature zones. All these causes combine to produce seasonal variations in rainfall, resulting in some localities in wet and dry seasons.

There is a normal increase of rainfall with altitude up to a certain point, above which it again decreases, on account of the smaller capacity for water vapor of the colder upper strata. The heaviest annual precipitation in

the United States is found in western Washington and north-western Oregon, with an average of 80 to 100 inches. It sometimes exceeds 126 inches for a single year at Neah Bay, Washington, and in 1896, at Glenora, Oregon, situated at a moderate elevation in the Coast Range, it amounted to 169 inches. The coast rainfall decreases rapidly toward the s., falling to 22 inches at San Francisco and to rather less than this amount at San Diego.

The great masses of the Sierra Nevada and Cascade Mts. extending at right angles to the prevailing winds, deprive the states to the eastward of the rain that falls abundantly on their western slopes, and the plateau lying between these ranges and the Rockies is the most extensive arid region of the United States. On the eastern slope of the Rocky Mts. the rainfall is at first deficient, but increases steadily as we go eastward, amounting to from 48 to 60 inches over the greater part of the Gulf and S. Atlantic states, with a maximum of 70 in limited areas of Georgia and the Carolinas, where moisture from the Gulf of Mexico and the Atlantic is deposited on the slopes of the Appalachians.

**Rain-gauge**, an instrument for measuring rainfall, consisting of a cylindrical, vertical metal vessel, whose sharp-edged top, of known diameter, is connected with a funnel that conducts the rain into an inner vessel.

**Rainer, Luise** (1911- ), Austrian actress. She won favor in *Saint Joan*, *American Tragedy* and *Men in White*. In 1935 she made her debut on the screen in *Escapade*. Her appearances as Anna Held in *The Great Ziegfeld* (1936) and O-lan in *The Good Earth* (1937) enhanced her reputation. She married Clifford Odets in 1936. In 1936 and 1937 she won the Award of the New York Dramatic Critics.

**Rainier, or Tacoma, Mount**, a mountain on the w. flank of the Cascade Range, in the s. part of Pierce co., Wash., about 41 m. s.e. of Tacoma city. It is a dormant volcano. The imposing cone towers 14,363 ft. above sea level. Thick forests cover the lower region of the mountain, while higher up there are 14 glaciers. Vancouver discovered Rainier in 1792 and named it in honor of Rear-Admiral Rainier, of the British Navy.

**Rain-in-the-Face** (?-1905), a chief of the Uncpapa tribe of the Sioux Indians, who came into prominence in 1876 as a leader in the Sioux outbreak of that year in the Yellowstone region, when the Indians surrounded and killed Gen. George A. Custer and five

companies of the 7th Cavalry, on the little Big Horn river, Montana, June 25, 1876.

**Rains, Claude** (1889- ), English actor. In 1915 he left the stage to join England's armed forces. After his discharge in 1919 he appeared in numerous plays. In 1926 he visited America again. After wavering between the N. Y. and London stage he finally went to Hollywood where his first film, *The Invisible Man*, won world-wide renown. Perhaps his most outstanding picture is *Anthony Adverse* (1936).

**Rainsford, William Stephen** (1850-1933), clergyman, was born in Ireland. From 1878 to 1883 he was assistant rector at St.

army, was kidnapped on July 2, 1907. Raisuli was largely responsible for the uprising of the tribesmen which forced French interference in Morocco in Aug., 1907.

**Rajah**, or more correctly **Raja**, a Hindu ruler, or a Hindu title. In patriarchal times the rajah was the head of clans banded together for mutual protection. The head of a confederacy of rajahs came to be distinguished by the title of maharajahs or great rajah. The British have recognized these maharajahs as autocratic rulers.

**Rajputana**, or 'the land of the Rajputs,' is the Indian territory between the Bombay Presidency and the United Provinces, with



© Ewing Galloway, N. Y.

*Mt. Rainier, Washington.*

James's Cathedral in Toronto. In the latter year he was called to the rectorship of St. George's P. E. Church, New York city. He resigned in 1906.

**Raisins** are dried grapes. They are produced chiefly in warm countries and contain 28 to 30 per cent. of sugar. California is the chief state of production in the United States, the annual pack being from 75,000,000 to 120,000,000 pounds. Muscatels are dried in Europe, while still attached to the vine. In California the fruit is cut off the vines and for the most part sun-cured.

**Raisuli, Mulai ben Mohammed** (c. 1867-1914), Moroccan bandit. He captured Ion Perdicaris, and kept him a prisoner from March, 1904, until June, when he released him upon the payment of a heavy ransom by the Sultan. Kaid Gen. Sir Harry A. Maclean, a British officer, commander of the Moroccan

the Punjab on the n. The British province of Ajmer-Merwara, having an area of 2,711 sq. m., is enclosed by 18 native states and two chiefships, of which the aggregate area is about 130,000 sq. m. Over half of the population is engaged in agriculture, and cattle raising is of great importance. The Rajputs form the aristocracy of the country and hold most of the land; they are a nation of warriors; p. 9,844,384.

**Rákóczy March**, the national air of the Hungarians, said to have been composed in the 17th century, and to have been the favorite of Francis II.

**Raleigh**, city, capital of North Carolina, and co. seat of Wake co. It is the seat of St. Mary's College (Episcopal), Meredith College for Women (Baptist), Peace Institute for Young Women (Presbyterian), a business college, and the North Carolina

State College of Agriculture and Engineering. Raleigh is an important industrial city, with cotton mills, wood-working and printing establishments, iron foundries, and manufactures of hosiery, yarns, underwear, school supplies, cotton oil, fertilizers, etc. In 1792 the site of the present city was chosen by the legislature for the location of the State capital. General Sherman and his troops occupied Raleigh in the spring of 1865; p. 46.897.

**Raleigh, Sir Walter** (1861-1922), English man of letters, was educated at Cambridge. He occupied the chair of English language and literature in Glasgow University from 1890 to 1904, when he was appointed to the same chair at Oxford. In 1915 he spent several months in the United States, lecturing at Princeton and Brown Universities. His works include *The English Novel* (1894); *Robert Louis Stevenson* (1895); *Style* (1897); *Milton* (1900); *Wordsworth* (1903); *The English Voyagers of the 16th Century* (1906); *Six Essays on Johnson* (1910); *Romance* (1917); *England and the War* (1918); *The War in the Air* (1922).

**Raleigh, Sir Walter** (1552-1618), English courtier. He joined the ill-fated expedition of Sir Humphrey Gilbert, his half brother, in 1578; in 1580 he assisted in quelling an insurrection in Ireland, and later served in



*Sir Walter Raleigh.*

(From the painting in the National Portrait Gallery, London.)

the Netherlands. During the next few years he sent out expeditions to America, explored the seaboard from Florida to Newfoundland, planted a settlement on Roanoke Island, on

the Carolina coast (1585), which proved a failure, and christened Virginia, to which, in after years, he sent other expeditions. He was the means through which the potato and tobacco plant were introduced and cultivated in England. His influence at court was often great, and he devoted all his ener-



*Statue of Ramses II.*

*Found at Tanis, Now at Turin.*

gies to crippling the power of Spain. In 1592 he prepared an expedition, which sailed under Frobisher, but the same year was himself sent to the Tower as a punishment for a court intrigue. In 1595 he sailed up the Orinoco, but was unable to establish any permanent settlement. In 1596 he took part in an expedition against Spain. In 1600 Raleigh was made governor of Jersey.

Upon the accession of James I. Raleigh fell into disfavor and in 1603, being suspected of complicity with Cobham in a plot against

the king, he was sent to the Tower and tried for high treason. But though condemned to death he was reprieved and allowed to make an expedition to Guiana in quest of gold. The expedition was a failure, and Raleigh was executed on Oct. 29, 1618. A poet, a philosopher, and a historian, as well as an explorer, Raleigh was the embodiment of the Elizabethan age.

**Ralph, Julian** (1853-1903), American author and journalist, born in New York city. At various times he was connected with the *Daily Graphic*, *Sun*, *Herald*, and *Journal*, all of New York, and achieved a wide reputation as a correspondent. He was with the Turkish army in 1897, and in 1899 went to South Africa as the correspondent of the London *Daily Mail*.

**Ram**, the protruding and strengthened bow given to many men-of-war of past centuries to be used as a weapon against an enemy's vessel. A beak of much the same kind, but usually above instead of below water, was anciently fitted to the galleys of the Romans and their successors. Modern experience seems to indicate that the ram is as dangerous to friend as to foe.

**Ramadán**, the ninth month of the Mohammedan year. The fast of Ramadán was instituted by Mohammed, and is one of the cardinal points of Islam.

**Rámáyana**, a great epic, which shares with the *Mahábhárata* the veneration of all pious Hindus. It is the work of an inspired Brahman named Valmiki, and describes the wanderings of Ráma, the seventh incarnation of Vishnu. It assumed its present form towards the end of the 4th or the beginning of the 3d century B.C. The precepts of the *Mahábhárata* point the paths of duty and obedience, and insist upon their fulfillment, whatever the cost or the personal sacrifice; the *Rámáyana*, more sympathetic and humane, emphasizes the joys of homely life, and lays stress upon filial, fraternal, and conjugal affection; pure, unselfish devotion to relatives and neighbors.

**Rameses**, name of several Egyptian Pharaohs. **RAMESSES II.**, who reigned from 1300 to 1230 B.C., is one of the greatest of Egyptian kings. He not only defeated a powerful coalition in Syria and so secured the north-eastern frontier of his dominions, but he completed the conquest of Ethiopia. He is famous as the builder of some of the most imposing of ancient Egyptian edifices and public works. **RAMESSES III.**, reigned from 1180 to 1150 B.C., waged successful war against the

Nubians, and cleared Egypt of the sea-Pirates. He built the beautiful temple of Medinet-Abu and other monumental works. Owing to Herodotus's story of his treasury, his name was famed for great wealth.

**Ramganga**, Western, riv., United Provinces, India, rises in Himalayas, and after a south-easterly course joins the Ganges nearly opposite Kanauj.

**Ramie**, or **China Grass**, the bast fibre obtained from the inner side of the bark of two varieties of a plant belonging to the order Urticaceæ. These plants, *Bahmeria nivea* and *B. n. tenacissima*, grow largely in India and neighboring countries, and are of great economic importance. The fibres are among the strongest and finest of all known textile materials.

**Rampolla, Mariano, Marchess del Tin-daro** (1843-1913), cardinal and papal secretary of state, born at Polizzi, Sicily. In 1869, he entered the papal service, and in 1875 was appointed counsellor of the papal embassy at Madrid. From 1880 to 1882 he was secretary of ecclesiastical affairs, and in 1882 became papal nuncio at Madrid, where he did good service in the dispute between Germany and Spain with regard to the Caroline Islands. In 1887 he was created a cardinal, and in May of the same year became under-secretary of state, and shortly afterwards secretary of state to Leo XIII. He resigned in 1903.

**Rampur**, tn., cap. of feudatory state, United Provinces, India, 38 m. n.w. of Bareilly; manufactures damask, pottery, and jewelry. The state of the same name has an area of 899 sq. m. of level and fertile country and a population of 450,000. The town has a modern fort, fine government buildings, and an important Arabic college; p. 73, 156.

**Rampur-Beauleah**, chief tn., Rajshahi dist., Bengal, India. Industries, silk and indigo; p. 21, 589.

**Ramsay, Allan** (1686-1758), Scottish writer. About 1719 he set up as a bookseller in Edinburgh. In 1725 he published the work which makes his name live—*The Genile Shepherd*, a dramatic pastoral. His place in literature is determined by the fact that he revived Scottish vernacular poetry which had been dormant for a century, and prepared the way for Fergusson and Burns.

**Ramsay, Sir William** (1852-1916), Scottish chemist, was born in Glasgow, and was appointed professor of chemistry in University College, Bristol, in 1880. In 1887 he was elected to the chair of chemistry in Univer-



sity College, London. Although Ramsay's first work was in organic chemistry, he soon turned his attention to what was then a new branch of the subject—physical chemistry—and became its leading exponent in Great Britain. In 1893 Lord Rayleigh's discovery of a difference between the density of the nitrogen obtained from the atmosphere and that from chemical compounds, led Ramsay to investigate the matter, which ended in his discovery, jointly with Rayleigh, of the element argon, a gas of hitherto unknown properties. Pursuing his investigations, he afterward isolated four more gaseous elements—helium, xenon, krypton, and neon. Possessed of great powers as a teacher, and of a personality that infected with enthusiasm, he founded a school of workers that produced a mass of interesting results. He was awarded (1904) the Nobel prize in chemistry.

**Ramsay, Alexander** (1815-1903), American politician, born near Harrisburg, Pa. He was the first territorial governor of Minn. in 1849-53. He became mayor of St. Paul in 1855; was governor of Minn. during 1859-63, and was U. S. Senator. In 1879 he succeeded George W. McCrary as Secretary of War; during 1882-84 he was chairman of the Utah commission.

**Rancé, Armand Jean le Bouthillier de** (1626-1700), founder of the Trappists, born of a noble family of Paris, was a great favorite at court, but retired to the abbey of La Trappe, where he instituted the severe discipline for which that monastery is celebrated.

**Ranch, or Range**, the unenclosed area on which cattle and sheep are grazed in the Western states of the U. S., the graziers and their assistants being known as ranchmen, ranchers, rangers, and cowboys. Ordinarily the term ranch is used to designate privately owned land, with the stock-yards, buildings, etc., while range denotes grazing grounds in general. Ranching is associated with Texas, Kansas, New Mexico, Arizona, Wyoming, Colorado, Montana, Idaho, California, and Oregon. The enormous ranges of Argentina and Uruguay and the 'stations' of Australia are corresponding institutions. See T. Roosevelt's *Ranch Life and the Hunting Trail* (1889).

**Rancidity**, the change that takes place in the 'non-drying' oils and fats when they are exposed to air and light. The change is recognized by the development of an objection-

able smell and taste, due to the formation of free fatty acids.

**Rand, Benjamin**, author (1856-1934), born in Canning, Nova Scotia, was educated at Acadia College, Harvard U., and Heidelberg U. He is emeritus librarian of philosophy at Harvard U., and among other works has written, *Bibliography of Economics*, (1895), *Modern Classical Philosophers* (1907), *Locke's Essay* (1931), *Berkeley's American Sojourn* (1932).

**Rand, The**, popular name of the rich gold-mining district of the Witwatersrand, w. of Johannesburg, Transvaal Colony, British S. Africa. Discovered in 1884, the Rand mines had, when the war broke out in 1899, an output of 4,256,800 oz. in the year.

**Randall, Alexander Williams** (1819-72), American politician, born in Ames, Montgomery co., N. Y. He moved with his father to Waukesha, Wis. In 1855 was appointed judge of the Milwaukee circuit court; in 1857 and 1859 was elected governor. He was minister to Italy in 1861, first assistant postmaster-general in 1862, and postmaster-general in 1866, and held the last-mentioned office until the close of Johnson's administration.

**Randall, James Ryder** (1839-1908), American journalist and poet, born at Baltimore. The attack on the Massachusetts and Pennsylvania troops in Baltimore on April 19, 1861, inspired his poem, 'Maryland, My Maryland,' which, set to music, has been called 'The Marseillaise of the South.' Randall wrote several other war songs. In 1865 he joined the staff of the *Augusta* (Ga.) *Constitutionalist*, and in 1866 became its editor-in-chief. In 1905 he became editor of the *New Orleans Morning Star*.

**Randall, Samuel Jackson** (1828-90), American politician, born in Philadelphia. He served in the Civil War; was elected to Congress as a Democrat in 1862, and served continuously from 1863 until his death in 1890.

**Randolph, Edmund Jennings** (1753-1813), American statesman, born in Williamsburg, Va. In 1786 he succeeded Patrick Henry as governor of Virginia, holding that office until 1788. He was a member of the Virginia constitutional convention of 1776 and of the Continental Congress during 1779-82. He became the first attorney-general under the new government and succeeded Jefferson as secretary of state in 1794.

**Randolph, Isham** (1848-1920), American engineer, was a member of the Board of the

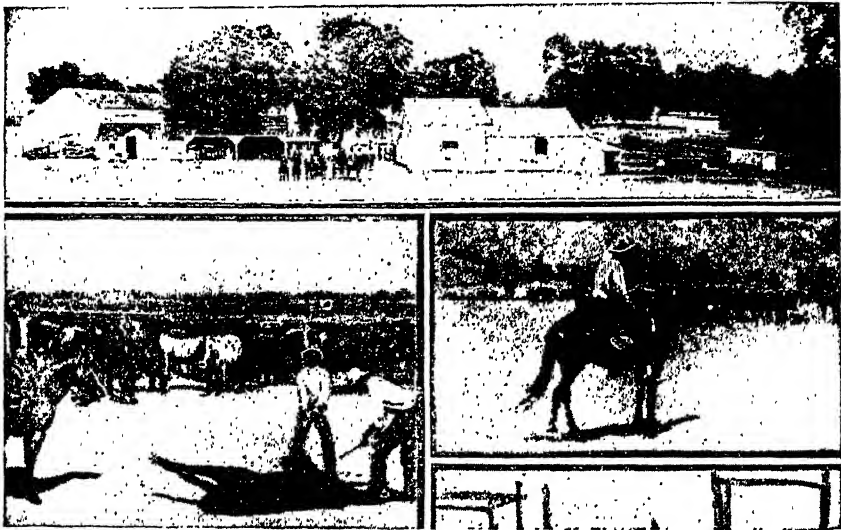
Isthmian Canal Commission. In 1880 he became chief engineer of the Chicago & Western Railroad and of the Belt Railway of Chicago; in 1885, the general consulting engineer of Chicago; in 1893, chief engineer of the sanitary district of Chicago, and brought to a successful conclusion the excavation and improvements of the Chicago river.

**Randolph, John**, 'of Roanoke' (1773-1833), American statesman, born at Cawsons, Chesterfield co., Va., June 2, 1773. In 1790 he went to Philadelphia, where he studied law with his kinsman, Edmund Randolph, whom Washington had made attorney-general of the United States. The ratification of

In 1807 he was foreman of the grand jury which indicted Aaron Burr for treason. He was a member of the Virginia constitutional convention of 1829. By his will, made in 1821, he emancipated his slaves.

**Randolph, Peyton** (1723-75), American patriot, born in Williamsburg, Va. He served in the French and Indian War; drew up the remonstrance of the Burgesses against the proposed Stamp Act; became chairman of the committee of correspondence and was president of the Virginia Committee of Safety in 1774. He was president of the first and second Continental Congresses.

**Randolph-Macon System of Colleges**



*Ranching.*

Top, Typical California ranch (Photo by Pierce, Los Angeles); Left, Branding wild horses; Right, Cattle round-up in Arizona (from stereographs, Copyright by Underwood & Underwood).

the Jay Treaty with England, in 1796, roused his strong opposition, and caused him to side with the faction in Virginia which consistently opposed the Federal government, and whose state's rights views were embodied in the Virginia resolutions of 1798. In the latter years, notwithstanding the powerful opposition of Patrick Henry, he was elected a representative in Congress, taking his seat in December, 1799. Although a member of the minority, he at once took a prominent part in debate, and in December, 1801, was made chairman of the committee of ways and means, a position which carried with it the leadership of the House. He supported Jefferson in the purchase of Louisiana.

**and Academies.** A group of educational institutions in Virginia under Methodist control. It consists of Randolph-Macon College for men at Ashland, chartered in 1830, with two academies, at Front Royal and Bedford City; and Randolph Macon Woman's College, at Lynchburg, established in 1893, with Randolph-Macon Institute, at Danville.

**Range Finders.** Modern long-range guns require a more accurate knowledge of the distance to the target than was necessary for the old-fashioned muzzle-loaders. A great many instruments of various patterns have been devised for the purpose of measuring ranges, which are generally not possible of direct measurement, on account of inter-

vening natural objects which are impassable, such as a river, or because of the proximity of the enemy. Of these the Barr and Stroud, and the Bausch and Lomb are used in the navy; the Lewis, in the army.

**Rangeley Lakes**, a series of connected lakes in Franklin and Oxford cos., Maine. The area of the lakes is about 80 sq. m., and their altitudes vary between 1,200 and 1,500 ft. They are a favorite resort for fishing and hunting.

**Ranger, Henry Ward** (1858-1916), American landscape painter, born in New York city, educated at Syracuse University. His works, in which New England hillsides and autumn woods are conspicuous, rank high with the best contemporary American landscape painting. Among the most noted are: *Morning at Highbridge*, *The Top of the Hill* (in the Corcoran Gallery, Washington), *An East River Idyll* (in the Carnegie Museum, Pittsburgh), and *Bradley's Mill Pond*.

**Rangers**, United States. Seventeen companies of infantry were organized during the War of 1812 under the name of Rangers and were made a part of the regular army of the United States, until mustered out of service in the reorganization of 1815. A large number of Rangers were mustered into the service in the Mexican War, where they proved themselves of the highest efficiency. Companies of Rangers are maintained at present in some of the Southwestern states.

**Rangoon**, tn., cap. of Lower Burma, on Rangoon R., is the chief seaport of Burma. The original town is surrounded by terraced and fortified pagodas, conspicuous among them being the Shway-Dagon (6th century). Rangoon came into British possession in 1852, and since then it has been transformed into a prosperous modern mercantile city. Its principal exports are timber, petroleum, rice, and spices; p. 400,000.

**Ranjit Singh** (1780-1839), Sikh prince, who became monarch of the Punjab, the independence of which he maintained against Afghanistan. He obtained from Shah Shuja, Afghan refugee, the Koh-i-nur diamond.

**Rankin, Jeannette** (1880- ), American public official, was born in Montana. She studied at the School of Philanthropy in New York City, did social service work in Seattle, was active in the National American Woman Suffrage Association, and was elected in 1917 to Congress, being the first woman ever to sit in the House of Repre-

sentatives. She became a member of the 77th. congress (1941-1943).

**Ransom**, a sum paid as an equivalent for the release of a captive. In early times ransoms were looked upon as prize money, and formed a substitute for pay, and even for war indemnities in the case of captured kings and great nobles. Ransoms were sometimes crushing, as in the case of Richard I. of England and of John of France. In the 16th century an officer's ransom amounted to one quarter of his annual pay. At the Revolution the custom of ransom was abolished in favor of exchange by equality of ranks.

**Rantoul, Robert, Jr.** (1805-52), American lawyer and politician, born in Beverly, Mass. In 1843 he became collector of the port, and during 1845-49 was United States district attorney for Massachusetts. He was a decided opponent of slavery, and in 1851 defended Thomas Sims, the first slave recovered under the Fugitive Slave Law of 1850 in Massachusetts.

**Ranunculaceæ**, a natural order of plants (the crowfoot family), mostly natives of temperate regions. The flowers generally have five sepals, five petals, numerous stamens inserted on the receptacle, and numerous ovaries. Among the genera are *Ranunculus*, *Adonis*, *Anemone*, *Clematis*, *Thalictrum*, *Trollius*, *Helleborus*, *Caltha*, *Pæonia*, *Delphinium*, *Aquilegia*, and *Aconitum*.

**Ranunculus**, a genus of herbaceous plants belonging to the order Ranunculaceæ. Among the species are the aquatic crowfoot (*R. delphinifolius*) and the field-buttercups of the naturalized species *R. acris* and *R. bulbosus*.

**Rapallo**, seapt., winter resort and place of pilgrimage, Genoa prov., Italy, has manufactures of lace and olive oil. Scene of a conference of Allied statesmen and generals, Nov., 1917, during the World War. The treaty of Rapallo, signed Nov. 12, 1920, was an agreement between Italy and Yugoslavia providing for the surrender of Dalmatia by Italy and creating Fiume as a free state connected with Italy by a territorial 'corridor' along the sea coast; p. 12,000.

**Rape**, an important cruciferous fodder plant which includes varieties of *Brassica Napus*. The cultivation of rape for forage is similar to that of other root crops, and it is used for fattening sheep, and as a cover-crop in orchards.

**Rape**, carnal knowledge of a female against her will by force, threats, or fraud.

**Raphael, Santi, or Raffaello Sanzio** (1483-1520), the greatest Italian painter of the Roman school, was born at Urbino. Timoteo Viti was his first master, and he entered Perugino's atelier in 1499 or 1500, where he was also under Pinturicchio's influence. He went to Florence in 1504, and came under the influence of Leonardo da Vinci and Michael Angelo. His extraordinary talents developed rapidly. His distinguishing qualities were mastery of workmanship, perfection of design and of form, harmonious beauty and serenity of expression, balanced by refinement of taste and purity of color. In 1508 he was summoned to Rome by Pope Julius II. to decorate the state apartments in the Vatican, a task for which he collected a school of artists to aid him. He decorated the ceilings and walls of four apartments. Of his many Madonnas the finest are the *Del Granduca*, *Del Cardolina*, the *Del Fcligno* (Vatican), and the magnificent *San Sisto* (Dresden). Among his finest portraits are *Julius II.* (Uffizi), *La Donna Velata* (Pitti), and *Joanna of Aragon* (Louvre). So beloved was he that all classes mourned his death. His body lay in state with his unfinished *Transfiguration* suspended above it, and he was buried in the Pantheon at Rome. See *Vasari's Life* (ed. 1878), Eng. trans. by Blashfield and Hopkins (1896).

**Raphia**, a genus of tropical palms, mostly natives of Africa, with elongated flowers and long, equally pinnatisect leaves. *R. ruffia*, a native of the Mascarene Is., furnishes, in its leaves, the fibre known as raffia, which is imported as a 'tie' material for plant nurseries, fancy work, etc.

**Rapid Fire Guns.** See **Guns.**

**Rapids**, a part of a river in which the current flows more rapidly than usual as it passes over some resistant band of rock. Rapids are usually barriers to upward navigation, although not necessarily so to downstream traffic. They are valuable as sources of mechanical power.

**Rapier**, a long, light, edgeless, and narrow sword, adapted for thrusting rather than for cutting. The blade has a lozenge-shaped section. The rapier was introduced in England from Spain, and in the 16th century was the 'favorite duelling weapon.

**Rapp, George** (1770-1847). Founder of the Harmonists, born in Germany. He emigrated to Pennsylvania in 1803. There in Butler co. he founded a society in which all things were held in common, and both sexes

agreed to observe the rule of celibacy. In 1815 the community removed to Indiana, and there established the town of New Harmony. Nine years afterward, however, they sold out to Robert Owen, and, returning to Pa., established the village of Economy in Beaver co.

**Rappahannock River**, a stream which rises in the Blue Ridge in Virginia, and pursues a general s.e. course, flowing into Chesapeake Bay. Length, 250 m. The Rapidan is its chief tributary.

**Rapti**, riv., United Provinces, India, rises in the Himalayas, runs s. and then n.w. into the Gogra. Length 400 m.

**Raquette Lake**, one of the numerous lakes of the Adirondack region, N. Y., in the n. part of Hamilton co. It is very irregular in shape and is about 10 m. long, and 1 to 2½ m. wide.

**Rare Earths.** The elements of the rare earths are metals that form earthy oxides and occur in a few minerals of complex composition, chiefly found in Scandinavia and America. Orthite, cerite, gadolinite, monazite, and samarskite are among the chief. Although our knowledge of the rare earths is in some cases imperfect, several of them have technical applications. Thus cerium is used in medicine, thorium and cerium in incandescent gas mantles, and yttrium and zirconium in Nernst lamp 'glowers.'

**Raritan River**, a stream of New Jersey, formed near Somerville by the junction of a n. and a s. branch, flowing e. to Raritan Bay, a western arm of Lower New York Bay, between New Jersey and Staten Island. The chief cities on its banks are Perth Amboy on the n. side of its mouth, and New Brunswick, 15 m. above, where there are falls, to which it is navigable. At New Brunswick it is spanned by a stone railroad bridge. The river is 75 m. long.

**Rashes**, the eruptions of such diseases as scarlet fever and measles. The term is usually applied only to those efflorescences which cover a considerable area of skin.

**Rashnu**, a deity of justice in the Persian religion of Zoroastrianism. He and Mithras are the judges who decide the fate of the soul after death.

**Raskob, John J.** (1879- ), American capitalist and public official, was born in Lockport, N. Y. He has been connected in many responsible positions first with the Du Pont de Nemours Co. and then the General Motors Corporation. In 1919 he was a mem-

ber of President Wilson's Industrial Conference. In 1928 he served as chairman of the Democratic National Committee. An active opponent of the prohibition laws, he polled the Democratic party leaders in 1931 to determine their attitude toward repeal of the Eighteenth Amendment. Despite vigorous opposition from Democrats in the south, he swung the party to repeal and was considered instrumental in obtaining inclusion of a repeal plank in the platform upon which Franklin D. Roosevelt was elected President in 1932.

**Raskolniki**, dissenters, members of non-conformist sects which have seceded from the Russian church.

**Rasmussen, Knud (Johann Victor)** (1879-1933), Danish Arctic explorer, born at Jakobshavn, Greenland, the son of a missionary and his Eskimo wife. After an excursion to Lapland (1901) he joined Mylius Erichsen's North Greenland expedition as ethnographer (1902-04). Three more Greenland expeditions (1905-10) were followed by the first expedition to Thule (1912-13), where he established the Kap York station, discovered Peary records deposited in 1892 and disproved the existence of the Peary Channel. Altogether he led five expeditions to Thule. His numerous books include *Eskimo Folk Tales, Across Arctic America* and *Reports of the Fifth Thule Expedition* (1928-30).

**Raspberry**. A bramble fruit extensively grown in home gardens throughout all temperate regions. The black raspberry, *R. occidentalis*, is of commercial importance as it is easily grown, is more productive, and the fruit stands shipping better than the red varieties, *R. strigosus*. Raspberries do best on deep, moist, loamy soil, and promptly respond to heavy fertilizing with well rotted barnyard manure. The black raspberry is propagated by rooting the tips of growing canes late in the summer. The fruit of the raspberry is borne upon the short fruit stalk produced from the wood of the previous season's growth. After the canes have borne fruit once, therefore, they should be removed, leaving five or six new canes which come up from the roots to take their place. Among the more promising varieties of the blacks are Gregg, Ohio, and Kansas. Cuthbert is one of the best of the red varieties.

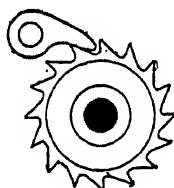
**Rasputin, Gregor Efimovich** (1873-1917), Russian lay monk, whose real name was Gregor Efimovich Novikh. He was born in Tobolsk, Siberia, of peasant stock. In his dissolute early life he was given the sobriquet of Rasputin, meaning licentious, or profligate.

His magnetic powers secured him a following even in Court circles, where he was introduced to the imperial family (1907), over whom he exercised a maleficent influence. The restoration to health of the young crown prince Alexis was attributed to his intervention. Stories of his infamous conduct scandalized all Petrograd, and attempts were made to take his life. Finally he was enticed to the palace of Prince Yussupoff (Dec. 29, 1917), where he was poisoned and shot. See Yussupoff's *Rasputin* (1927); M. V. Rodzianko's *Reign of Rasputin* (1927); René Fülöp-Miller's *Rasputin, the Holy Devil* (1928).

**Rastatt**, tn., Baden, Germany. Principal industries are manufacture of lace and cigars. The palace is built on the model of that at Versailles.

**Rat**, the largest species of the rodent genus *Mus*, the smaller members of which are known as mice.

**Ratchet and Pawl**. The ratchet is usually a toothed wheel, into which the pawl, a sort of lever with a tooth, engages, and allows forward but prevents backward motion. It is used in capstans and hoisting machinery for safety.



*Ratchet and Pawl.*

**Rathenau, Walter** (1867-1922), German statesman, born in Berlin. His efficient organization at the outbreak of the World War enabled Germany to hold out with raw materials. Foreign Minister in 1922, at the Cannes conference he secured a diminution of the reparations payment of 1922, and at the Genoa conference concluded the treaty with Russia. He was assassinated at Berlin by Erwin Kern, a naval lieutenant, and Lt. Hermann Fischer, of the army. The assassins committed suicide a month later as their capture became imminent, but in 1933 officials of the National Socialist Government dedicated a tablet to their memory as "martyrs."

**Rathenow**, tn., prov. Brandenburg, Prussia. The principal industry is the manufacture of spectacles and telescopes; p. 27,565.

**Ratibor**, tn., prov. Silesia-Prussia; has railway workshops and manufactories of

paper, glass, iron and steel, chemicals, and furniture; p. 41,210.

**Rating.** The rating of an enlisted man in the navy is the grade or position held by him in the service. The rating of every enlisted man is made, primarily, by the commanding officer of the ship to which he is attached and is revocable by that officer.

**Rationalism.** In theology, a system by which religious opinions are deduced from reason. The term is used loosely and popularly in Great Britain and America, but in Germany technically and exactly, being applied to a theological school which flourished in the late 18th and early 19th centuries, and which came in as a sort of mediator between supernaturalism and naturalism or deism. Rationalism, in the modern English acceptance of the term, is intellectually the opposite of irrationality, and denotes thinking that aims at the proof of propositions by reasoning alone, or as little influenced as possible by emotion.

In philosophy, rationalism has two well-marked meanings. In epistemology it means the type of philosophy which makes reason the chief source of knowledge. Empiricism, on the contrary, holds that all knowledge is generated by experience. The modern philosophy of such thinkers as Descartes, Spinoza, and Leibnitz was strongly rationalistic; while the British thinkers Locke, Berkeley, and Hume were empiricist in tendency, Hume in particular being an extreme representative of empiricism.

In ethics, rationalism is used as an antithesis to hedonism, and then means an ethical theory which recognizes in reason the only source of moral truth, and which therefore tends to depreciate pleasure and feeling generally as incapable of yielding any objective moral principles, and as apt to interfere with the purity of moral motives and action.

**Rationing** is the equal allocation of commodities of which there is or may be a wartime shortage. It was begun in the U. S. in 1942, its control being made a function of the Office of Price Administration.

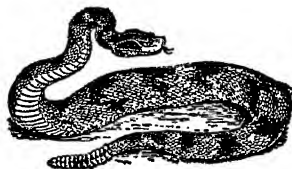
**Rations.** A ration is the allowance for the daily subsistence of one person in the armed forces. In the U. S. army rations are known as garrison, field, travel, and emergency rations. The garrison ration is issued to troops in garrisons or permanent camps; the field ration to troops in active campaign; the travel ration to troops travelling otherwise than by marching, or when they are separated from cooking facilities; and the emergency ration to troops

in active campaign for use on emergent occasions.

**Ratisbon** (Ger. *Regensburg*), tn., Bavaria, prov. Upper Palatinate, on r. bk. of Danube. The town is exceptionally rich in mediæval remains and works of art. It manufactures tobacco, machinery, pencils, and soap. Six m. below the town, above the Danube, stands the Walhalla, or hall of fame for distinguished Germans. The town was founded by Tiberius. It was the capital of the Eastern Franks in the 9th century. Near the cathedral is the hall in which the German Diets held their meetings from 1645 to 1806. Numerous ecclesiastical councils have been held here; the bishopric was founded in 642; p. 76,948.

**Ratlam**, chief tn., Ratlam state, Central India, 65 m. n.w. of Indore. Center of opium and grain trade in Malwa; p. of State 85,489.

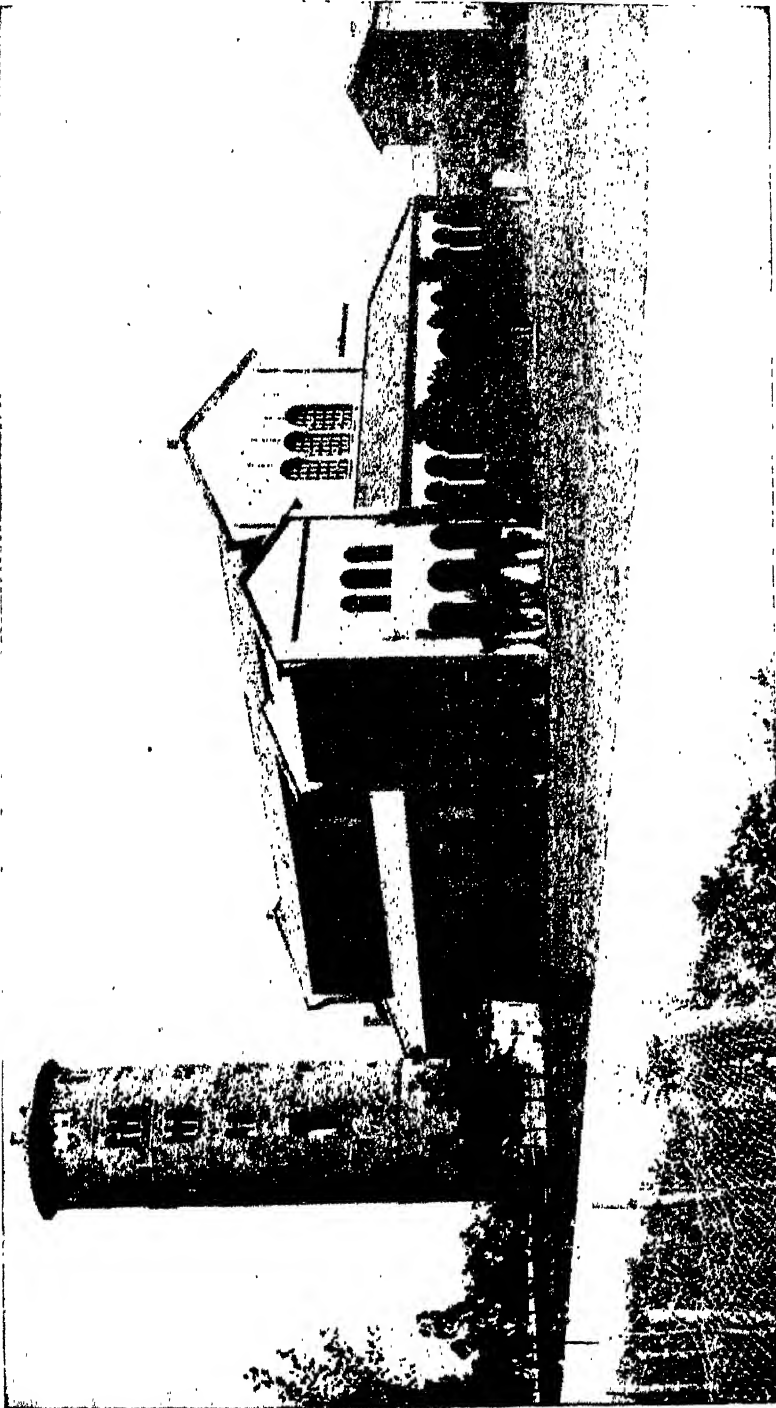
**Rattlesnake** (*Crotalus*), a genus of poisonous snakes confined to the New World. The rattlesnakes belong to the pit-vipers (*Crotalinae*), a group of viperine serpents characterized by the presence of a deep sen-



*Rattlesnake.*

sory pit between the eye and the nostril at each side; but their special peculiarity is the rattle, or appendage of the tail. This consists of a series of hollow horny rings, or 'bells,' loosely joined together, so that they are freely movable, and produce, when shaken, a loud rattling noise. The extremity of the rattle is a button-like structure, which is really the horny tip of the tail. The use of the rattle has been much discussed; the usual explanation is that the sound is of service in warning off enemies, but it seems more likely that it is used as a call during the breeding season.

The common rattlesnake (*C. durissus*), found in the Eastern United States from Vermont to Florida, and westward to the Great Plains, varies in color from yellow to brown, olive, or black, and is marked with wide wavy bands of dark brown or black. It is about four ft. long and an inch and a half in diameter, and lives preferably on mountain ledges and in other rocky places, large



© Burton Holmes, from Ewing Galloway, N. Y.

*Ravenna: The Basilica of Sant' Apollinare Nuovo.*

The Basilica was erected in 500, by Theodoric the Great, as an Arian cathedral.

numbers gathering together in what is known as a Rattlesnake den. The Diamond Rattlesnake (*C. adamanteus*) of the Southern States is a larger and heavier species, olive green in color, with darker diamond-shaped markings. It attains a length of six to eight ft. and is extremely poisonous. The Prairie Rattlesnake (*C. confluentus*) is greenish yellow, marked with large round blotches of brown. It is about four ft. long, vicious when wild, but lazy and good-natured in captivity.

**Rauschenbusch, Walter** (1861-1918), American theologian and writer, was born in Rochester, N. Y. He spent some ten years in religious work among the German immigrants in New York City; and in 1902 became professor of Church history in Rochester Theological Seminary. His published works include *Das Leben Jesu* (1895); *Christianity and the Social Crisis* (1907); *A Theology for the Social Gospel* (1917).

**Ravel, Maurice** (1875-1938), impressionistic composer, most outstanding figure in contemporary French music, was born in Cibourne, Basses-Pyrénées, and studied at the Paris Conservatory, piano under de Beriot, composition with Fauré. Ravel's work is marked by several notable traits that have made acceptance of his unique style somewhat difficult, though he is ranked by many critics second only to Debussy. A rare delicacy, a refinement at times almost too intellectual, a flair for the unexpected harmonic turn, restriction of subjects chosen for musical development, and an emotional reserve that is hard to pierce have made his works difficult to grasp at once, but these very qualities have given him a high place among the moderns. Among his works are, for orchestra, *Schéherazade*, *Rapsodie Espagnole*, *Bohéro*, the ballet *Daphnis and Chloé*, and for piano, *Pavane pour une Infante Défunte* and *Jeux D'eau*.

**Ravelin.** See **Fortification**.



Raven.

**Raven** (*Corvus corax*), a large member of the crow family, widely distributed over the northern parts of both hemispheres.

**Ravenna**, province, Italy, lying between the Adriatic Sea and Bologna.

**Ravenna**, city, Italy, capital of the province of Ravenna. It has many points of interest and in the history of early Christian art stands second only to Rome. Of special interest are the Baptistery of the Orthodox or San Giovanni, Dante's tomb, and the Academy of Fine Arts. The principal trade is in wine, silks, musical instruments, glass, soap, and starch. Ravenna is one of the most ancient towns in Italy. The Umbrians and Etruscans settled here on the invasion of Italy by the Celts. Augustus made it the headquarters of his Adriatic fleet, and under succeeding emperors it became one of the chief cities of Italy. It remained subject to the papal see from 1509 to 1797, was subject to France from 1797 to 1814, when it was restored to papal dominion. Since 1859 it has formed part of the kingdom of Italy; p. 78,997.

**Ravenscroft, Thomas** (1592-1640). English musical composer, was the author of *Melismata* (1611), and of a collection of psalm-tunes for four voices, *The Whole Book of Psalms* (1621) by various composers. Some of the tunes, such as St. Davids, Canterbury, Bangor, and many others, are by Ravenscroft himself.

**Rawalpindi**, city and cantonment, India, in the Rawalpindi district, Punjab; one of the largest military stations in India; p. 101,142.

**Rawitsch**, or **Rawicz**, town, Poland. Prior to World War I the town belonged to Germany; p. 11,827.

**Rawlins, John Aaron** (1831-69), American soldier, remained with Grant throughout the war, becoming chief of staff. When Grant became President, he appointed him secretary of war, but Rawlins died September of the same year.

**Rawlinson, Sir Henry Creswicke** (1810-95), English soldier, scholar, and diplomatist, assisted in the organization of the Persian army (1833-9), spending his leisure in cuneiform research. He was made consul at Bagdad in 1844.

**Ray**, a general name for the elasmobranch fishes belonging to the order Selachii. They have a flattened body and large fleshy pectoral fins.

**Rayleigh, John William Strutt**, Third Baron (1842-1919), British physicist, in 1887 went as professor of natural philosophy to the Royal Institute, where he remained until 1905. On the recommendation of the U. S.



National Academy of Sciences, of which Lord Rayleigh was a member, he was awarded the Barnard medal by Columbia College, in 1895, 'for meritorious service to science.' In December 1904, he was awarded the Nobel prize for physics.

**Raymond, Andrew Van Vranken** (1854-1918), American clergyman and educator, was born in Visscher's Ferry, N. Y., and was pastor of Reformed and Presbyterian churches in New Jersey and New York from 1878 until 1894. He was president of Union College from 1894 to 1907, and pastor of the First Presbyterian Church, Buffalo, from 1907 to 1918.

**Raymond, Henry Jarvis** (1820-69), American journalist and politician, became an assistant editor under Greeley when the latter founded the *Tribune*. In 1851 he founded the *New York Times* as a strong anti-slavery organ. In 1854 he served in the State assembly and was elected lieutenant-governor of the State. He was a member and a leading spirit in the first national convention of the new Republican party, and drafted the noteworthy *Address to the People*.

**Raymond, John Howard** (1814-78), American educator, was born in New York City, became professor of belles-lettres in Rochester University, and in 1856 organized the Brooklyn Collegiate and Polytechnic Institute. He was organizer and president of Vassar College from 1865 until his death.

**Raymond, Rossiter Worthington** (1840-1918), American mining engineer, was president of the American Institute of Mining Engineers (1872-4) and its secretary (1884-1911), U. S. commissioner to the international exhibition at Vienna (1873), and New York State commissioner of electrical subways for Brooklyn (1885-8).

**Raynaud's Disease**, or **Symmetrical Gangrene**, so called from being first described by Raynaud, a French physician, in 1862. It is generally more or less symmetrical, affecting fingers or toes, or both, on both sides, and perhaps spreading up the arms or legs. It seems to be encouraged in the first instance by cold, exposure, or shock, acting on an unstable nervous system. It is frequently found associated with other diseases of the nervous system.

**Rayner, Isidor** (1850-1912), American legislator, was born in Baltimore. After serving as State representative (1878-80) and State senator (1885-7), he was elected to Congress (1886-92). He was attorney-general of Maryland in 1899-1903, and as counsel for

Rear Admiral Schley won a high reputation for his knowledge of admiralty law. From 1905 until his death he was United States Senator.

**Rayon**, a synthetic fibre and the fabric woven from it. After the curtailment of silk supplies from Japan (July, 1941), rayon became the textile fibre of the day. See p. 4067.

**Razorbill** (*Alca torda*), a marine bird of the auk family, found along the North Atlantic coasts throughout the year.

**Razors**, sharp instruments used to remove hair from the face or other parts of the body, in use since early in the world's history, as is evidenced by wall paintings of ancient Egypt. The razors of that time were probably made of bronze. Today razor blades are made of fine crucible steel.

**Razorshell**, or **Razorclam** (*Solen*), a genus of bivalve mollusks, whose members burrow in sand, and are widely distributed throughout the world, being absent only from Arctic seas.

**Rea, Samuel** (1855-1929), American railroad man, was born in Hollidaysburg, Pa. He was in charge of the construction of the New York tunnel extension and station of the Pennsylvania Railroad in New York City. In 1913 he became president of the Pennsylvania system.

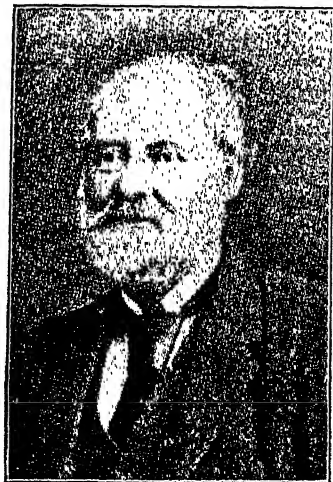
**Read, George** (1733-98), American patriot, signer of the Declaration of Independence, was born in Cecil co., Md. He was vice-president and for a time acting-president of Delaware, was one of the commissioners chosen to settle the boundary dispute between New York and Massachusetts; was a United States senator during 1789-93, and was chief-justice of Delaware from 1793 until his death.

**Read, Nathan** (1759-1849), American inventor, in 1788 began experiments with steam engines with a view to adapting them to the propulsion of boats and carriages. He invented a successful multitubular boiler in 1789.

**Read, Opie Percival** (1852-1939), American author, was born in Nashville, Tenn. He received a public school education and in 1878 became editor of the *Arkansas Gazette*. In 1883 he established the *Arkansas Traveler*, a humorous sheet that for ten years was widely quoted. After 1891 he was engaged in literary work in Chicago. His publications include: *A Kentucky Colonel* (1898); *A Yankee from the West* (1899); *The Wives of the Prophet* (1900); *The Starbucks* (1902); *An American in New York* (1905); *Tom and the Squatter's Son* (1910); *The New Mr.*

*Howerson* (1914); *Gold Gause Veil* (1927).

**Reade, Charles** (1814-84), English novelist and playwright, studied at Lincoln's Inn Fields, settled in London and spent most of his life in that city, though frequently traveling abroad. His first literary work, in which he collaborated with Tom Taylor, was *Masks and Faces* (1852), which he later turned into the novel *Peg Woffington*. His masterpiece, *The Cloister and the Hearth*, an historical romance of the fifteenth century, dealing vividly and brilliantly with European life and manners of that period, was produced in



*Charles Reade*

1861. Other noteworthy works are *Art*, a one-act play which still flourishes as *Nance Oldfield*; *It is Never Too Late to Mend* (1856), a realistic exposure of jail abuses in England and Australia; *Hard Cash* (1863), a bold handling of problems concerning insane asylums; *Griffith Gaunt* (1866), later dramatized as *Jealousy*; and *Foul Play* (1869), written in collaboration with Dion Boucicault and also dramatized. He also wrote books of less value but containing many striking passages.

**Reading**, city, Pennsylvania. Because of its location within a few miles of one of the world's largest coal deposits, and its accessibility to the seaboard, Reading is an important industrial center. Industries include: hosiery, door knobs, fabrics, steel castings, children's shoes, menthol cough drops, silk underwear, bricks, goggles, stone and limestone quarries. Albright College and the engineering department of the Pennsylvania State College are situated here; p. 110,568.

Reading was laid out in 1748 by Thomas and Richard Penn, and was named for Reading, England, the home of their father, William Penn.

**Reading**, municipal, parliamentary, and co. borough, cap. of Berkshire, England. The splendid Benedictine abbey, founded in 1121 by Henry I., who was buried here, is represented by considerable ruins and a fine gateway, restored in 1861, and surrounded by public gardens. The university extension college, affiliated with Oxford, was opened in 1892. Cloth making was formerly the staple industry. The town is now a market for agricultural produce, and has important industrial establishments including biscuit works, seed warehouses, iron foundries, engine works, malt works, and breweries; p. 97,153.

**Reading, Viscount Erleigh Rufus Daniel Isaacs**, First Earl of (1860-1935), English jurist and public official, of Jewish extraction, was born in London. He was elected to the House of Commons in 1904, became Solicitor General in 1910, and Attorney-General in the same year. In 1913 he became Lord Chief Justice of England. He was the head of the Anglo-French Commission to the United States in 1915 to arrange for a Government loan to the Allies, and early in 1918 was appointed British High Commissioner and special Ambassador to the United States. In January, 1921, he was appointed Viceroy and Governor-General of India, serving until 1926. Secretary of State for Foreign Affairs in first National Government, 1931.

**Readjusters**, or **Refunders**, a political faction in Virginia which worked for the repudiation of the State debt between 1878 and 1885.

**Reagan, John Henninger** (1818-1905), during the last months of the Confederacy acted as secretary of the treasury. Captured with President Davis in 1865, he was confined at Fort Warren in Boston Harbor, where, foreseeing the radical legislation that was to come, he wrote his famous 'Fort Warren' letter advising the Texans to forestall such legislation by conferring upon the negro certain civil rights. This brought him for a time into disfavor. From 1875, however, he was sent continuously to the House of Representatives until 1887, when he was elected to the Senate. In his congressional career he was distinguished for his business ability, the 'Reagan Interstate Commerce Bill' still forming the basis of such legislation.

**Real**, in civil law, signifies 'of or relating to property movable or immovable.'

**Real**, a small Spanish silver coin or money of account, current in several Spanish-speaking countries, with a value, varying with exchange, of about five cents.

**Realism** in *philosophy* is diametrically opposed to Nominalism as involving the belief that genus and species are *real* things, existing independently of our conceptions. In art and literature the word Realism or Naturalism is employed to describe a method of representation without idealization.

**Reality**. Psychologically, real objects are distinguished from illusions, hallucinations, and the like. Logically, an affirmation of reality is distinguished from an affirmation of mere possibility and from one of complete necessity. The judgment of possibility expresses merely the fact that the thing whose possibility is alleged is not inconsistent with known conditions. The judgment of necessity affirms the dependence of the thing whose necessity is alleged upon conditions. Metaphysically reality is opposed to appearance, and then signifies the inner being or ultimate truth of things as contrasted with the more superficial characteristics.

**Real Property**, in English and American law, signifies rights in land, and other 'real' right, (see **REAL**) which are inheritable. It includes 'incorporeal hereditaments,' such as hereditary titles of honor, and is in general a rival class to that included in *personal property*.

**Ream**, a quantity of paper, consisting of (1) 20 quires of 24 sheets each, or 480 sheets, of writing paper; (2) 472 or 500 sheets of drawing paper; (3) 21  $\frac{1}{2}$  quires, or 516 sheets, of printing paper.

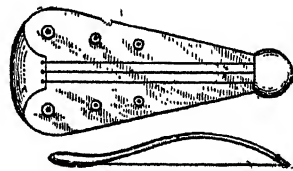
**Reamer**, a hand tool used to enlarge a hole in a metal place.

**Reaping** of grain was formerly done with the sickle, but in countries where agriculture has reached an advanced state it is now in a great measure performed by means of the self-binder or harvester. In 1831 Cyrus H. McCormick invented his reaper. This machine doubled the production of wheat per capita, and released more than one-half of the agricultural population for manufacturing industries. In 1831 Obed Hussey of Ohio also invented a reaper. A more highly developed harvesting machine of the present day is the combined harvester and thresher, operated by horse, steam, or other power. Wheat and oats are usually harvested before they are fully ripe and while the straw is still tinged with green, as a stronger and better product is thus obtained.

**Rear Guard**, a detachment of troops that protects the rear of an army on the march. It does all in its power to hinder the pursuit by defending all positions, and causing the enemy to deploy; by destroying bridges, roads, and boats; blockading defiles, deepening fords, removing transportation, destroying crops, etc.

**Reason**, a term used with many different shades of meaning. We oppose reason, broadly, as the human faculty to the mere sense and instinct of the animal mind; and in defining this opposition more closely, the term reason is often specially used in reference to man's ability to form general ideas, and so transcend the immediate sense experience of the moment. With the older English philosophical writers, such as Locke and Hume, it meant reasoning, as opposed to direct perception and feeling. With Kant the term pure reason is specially employed to denote the *a priori* principles that are inherent in the rational faculty as contrasted with mere generalizations of empirical fact. In ethics, reason is opposed as the governing and directive faculty to the promptings of impulse, passion, and desire. In theology, reason has been opposed to revelation as a higher truth not attainable by the human mind for itself, and to faith, as the higher or spiritual faculty by which such truth is received.

**Rebec**, an obsolete form of stringed instrument, popular throughout Europe during the Middle Ages. It was the precursor of the viol.



*Rebec.*

**Rebellion** is deliberate organized resistance by force and arms to the laws or operations of a government by those who owe it obedience. It may afterward, if it succeeds in its aims, come to be called a *Revolution*.

**Rebus**, an enigmatical representation of a name or thing by using pictorial devices for letters, syllables, or parts of words. The term probably originates from the device speaking to the beholder *non verbis sed rebus*.

**Rebus**, in heraldry. See **Armes Parlantes**.

**Recall**. The *Recall of an Officer* is an election process by which his constituents at-

tempt to retire him before his term expires. A specified number of them—usually not less than one-fourth—sign a petition for a recall election, and present it to a clerk or secretary of state, who immediately issues an election notice. The petitioners present the name of some person whom they ask the officer's constituents to choose as his successor. Other bodies of petitioners may present other names. The officer sought to be recalled is himself a candidate, unless he declines. If he gets more votes than any of his competitors, he stands vindicated and retains his office. Thirty or forty cities have used the recall against their executives and councilmen. Los Angeles, Seattle, Tacoma, and Wichita afford the most prominent cases.

**Récamier, Madame (née Jeanne Francoise Julie Adélaïde Bernard)** (1777-1849), French political and social leader, was born in Lyons. She grew up a girl of remarkable grace and beauty, and at fifteen was married to M. Jacques Récamier, a rich banker about thrice her own age. Her salon was soon filled with the brightest wits of the literary and political circles of the day. For Madame de Staël she had a warm affection that survived the exile required by the jealousy of Napoleon. Soon after this her husband was completely ruined, and Madame Récamier visited Madame de Staël at Coppet in Switzerland (1806). Here she met Prince August of Prussia, who alone of all her numerous admirers is supposed to have touched her heart. Indeed, a marriage was arranged, provided M. Récamier would consent to a divorce. The good man did not refuse, but his kindness was too much for the generous heart of Madame Récamier, who declared she could not leave him in his adversity. The distinguished friend of her later years was M. de Chateaubriand. She wrote charming *Souvenirs et Correspondence* (1859.)

**Recapitulation**, in embryology, or **Von Baer's Law**, a biological doctrine which expresses the view that the development of the individual is a repetition in brief of the history of the race.

**Receipt** is a formal acknowledgment in writing of the payment or delivery of money or goods, granted by the party receiving the same.

**Receiver**, a person or corporation appointed by a court to take possession of property which is involved in litigation, either as the subject matter or incidentally, and to pre-

serve, manage, and dispose of it for the benefit of those entitled thereto. The most frequent cases in which receivers are appointed are: (1) where members of a co-partnership disagree and a dissolution is necessary; (2) where the stockholders of a corporation disagree, or where the majority are wasting its assets or otherwise abusing their power; (3) where a lien on property is being foreclosed, and justice requires that the accruing rents and profits shall be applied on the indebtedness thus secured.

**Receiving Stolen Goods**, the offence of accepting possession of stolen goods, with the dishonest intention of depriving the rightful owner of his property. In most of the United States it is a felony, classed under the head of larceny, and punishable with about the same degree of severity.

**Recent, or Post-Glacial**, a geological epoch which extends from the close of the Ice Age (or Pleistocene) to the present day. It is also called the Human, as the implements and weapons of man are its most characteristic and important fossils. It is now included by many geologists in the Pleistocene epoch. The principal sources of our knowledge of the epoch are the peat bogs, which have accumulated in swamps, the calcareous formations and red earth of caves, the silt of fresh-water lakes, the gravel terraces of existing rivers, and the finer alluvial deposits, such as brick earth and sand.

**Rechabites, Independent Order of**. A beneficial and fraternal order founded in England in 1835 and in the United States in 1842, for the purpose of encouraging total abstinence through moral suasion.

**Recidivist**, an habitual criminal, one who is apparently incapable of reformation, and who makes crime a profession.

**Recife**, or **Pernambuco**, city, capital of the state of Pernambuco, Brazil. The city, called the 'Venice of America,' is located at the mouths of the River Beberibe and Capiberibe, and occupies the island of Antonio Vaz, lying between them and the two farther shores of both rivers, the three parts of the city being connected by several artistic bridges. It is the nearest South American port to Europe. Recife's export trade is largely in sugar, cotton, and alcohol. Recife was founded in 1526 by the Portuguese. In 1630 the whole coast was seized by the Dutch. Following the separation of Brazil from Spain, the Portuguese, who had retired

to the interior, began an irregular war upon the Dutch settlers, and after twelve years expelled them; p. 472,000.

**Reciprocal**, in mathematics, is the quotient obtained by dividing unity by a number. The product of a quantity and its reciprocal is thus unity; and the reciprocal of a fraction is obtained by interchanging numerator and denominator.

**Reciprocating Motion**, motion to and fro in a straight line, like that of the piston of a steam-engine.

**Reciprocity**, in economic history, mutual concessions between nations by which tariff rates or commercial discriminations are lowered, abolished, or abandoned.

**Recitative**, a species of music—frequently written without key signature—much used in the declamatory passages which constitute an important feature in oratorios and operas.

**Reclamation, U. S. Bureau of**, a bureau of the Department of the Interior at Washington, organized in July, 1902, under the Reclamation Act of June 17, 1902. It is engaged in the investigation, construction, and operation of irrigation projects in arid and semi-arid States of the far West, and in the establishment of settlers thereon. Among its projects is Boulder Dam on the Colorado. Under present laws, soldiers and sailors of all wars have a preference right of 90 days to enter the public land farm unit. The Bureau's library contains descriptions of all projects.

**Reclamation of Land**, the process of making land suitable for agriculture by irrigation or drainage. Among the most notable achievements in reclamation are the great works constructed by the United States government to put water upon the arid public lands in the West. Holland, by its extensive system of dykes and sea-walls, furnishes a notable example of land reclamation. In 1918 a bill was passed by the Dutch Parliament for reclaiming a part of the Zuider Zee by building a dyke across the northern part. The entire work will cover a period of some 35 years. See CONSERVATION MOVEMENT; PUBLIC LANDS.

**Recluses**, the name given to men and women who, in mediæval times, left the world to live a life of prayer and contemplation; dwelling in a cell, usually attached to a church, sometimes within the precincts of a monastery. In modern parlance the term is applied to anyone who mingles little in society.

**Recognizance**, a bond or obligation entered into before a court of record and made a part of the record.

**Recoil**, the backward movement of a gun on being discharged.

**Reconnaissance**, a military term to denote information as to the theater of operations—the strength, position, morale, etc., of the different divisions of the enemy in the field—obtained by troops or individuals after the outbreak of hostilities.

**Reconstruction**, a term used in United States history to describe the process by which and the period in which the 'states' that seceded in 1860 and 1861 were brought back into the Union. The collapse of the Confederacy found the victorious North without a settled plan for dealing with the seceded 'states.' Since fundamental Constitutional laws had not been provided for such a contingency there were numerous conflicting plans. The legal problems related mainly to the status (1) of the Southern 'state' organizations, (2) of the Southern people, and (3) of the negroes. Were the negroes citizens or wards? Should the 'state' or the federal government fix the status of the ex-slave? Was the 'Union as it was' to be restored, or had a new and more perfect one been evolved from the war struggle? On Dec. 8, 1863, Lincoln by proclamation announced that he would recognize, so far as the executive could do so, any 'state' reorganized by as many as ten per cent. of the number of voters in 1860 who should ask for pardon and take the oath of allegiance to the United States. Congress, however, opposed the President's work by refusing in 1864 to receive senators from Arkansas, and by passing in July, 1864, the Wade-Davis bill which contained an assertion of the right of Congress to undertake the work of reconstruction. President Johnson began the work of restoring the seceded 'states' to the Union.

As directed by the President, after the conventions had planned new 'state' governments, elections were held under the new constitutions, the legislatures met, and, with the exception of Mississippi, ratified the proposed Thirteenth Amendment abolishing slavery. Senators and representatives were chosen, and then the officials of the provisional government gave place to those elected by the people. This was done in all the 'states' except Texas before the close of 1865; and the 'restoration' was complete if Congress would accept it by admitting the Southern sena-

tors and representatives. Meanwhile, however, President Johnson's policy had aroused much opposition. Before Congress met in December two 'states,' South Carolina and Mississippi, passed 'Black Codes' to regulate the status of the freedmen, and not unnaturally caused friends of the negroes to believe that further guarantees must be secured. Congress on meeting in December refused to admit the Southern senators and representatives, and appointed a Joint Committee on Reconstruction to examine into and report on conditions in the seceded 'states.' After an extended investigation this committee brought in a report recommending the rejection of the President's work. Many Northern people of moderate views hesitated before rejecting the work of the President and reducing the South to a territorial condition. With regrettable shortsightedness the other reconstructed legislatures, in the winter of 1865-66, followed the example of Mississippi and passed 'Black Codes.' Equally effective as campaign arguments in influencing Northern public opinion were frequent outrages upon the blacks.

The Congressional campaign of 1866, with reconstruction as the main issue, was most exciting. In Jan., 1867, by a bill passed over the President's veto, negro suffrage was initiated in the territories and in the District of Columbia. On March 2, by the Tenure of Office Bill, likewise passed over the President's veto, Congress limited the power of the President in the matter of the dismissal of officeholders and left him only the power of suspension. On the same day the first great Reconstruction Act was passed, and was quickly supplemented by the acts of March 23 and July 19, passed by the Fortieth Congress. The late Confederate states, except Tennessee, were divided into five military districts, each under a general officer; a new electorate was to be enrolled without regard to color, but the upper classes of the whites were to be disfranchised. Delegates were then to be elected in each 'state' to a constitutional convention, which must frame a constitution in harmony with the Reconstruction Acts; and these constitutions were then to be sent to Congress for approval. The army was put in charge of the electoral machinery. After the new legislatures had ratified the proposed Fourteenth Amendment seven 'States' were in June, 1868, admitted to representation in Congress. The other 'States' were not readmitted until 1870, the ratification of the proposed Fifteenth Amendment being made

a condition. Meanwhile, in order to get rid of the President's opposition, several unsuccessful attempts had been made in 1866-7 to impeach him. When it seemed probable that the Supreme Court might rule adversely to the constitutionality of the Reconstruction Acts, Congress hastened to abolish the statute under which the case was brought. This and the Republican victory in the Presidential election of 1868 made safe the Congressional plan of reconstruction, and from 1868 to 1876 it was fully worked out.

Led by a few native whites ('scalawags') and a few whites from the North ('carpetbaggers'), the negroes for a time controlled each 'State,' and a vast amount of corruption followed. Among the white population the Ku Klux Klan developed into a strongly organized, secret, revolutionary movement which assisted in intimidating negro voters. In some instances these societies no doubt served a good purpose, but served still further to prejudice the Northern people against the South, with the result that governmental interference continued longer than it would otherwise have done. Enforcement legislation of 1870 and 1871 gave supervision of elections to Federal officials, who ordinarily supported the Radical local leaders. The whites regained control and restored more orderly government. The various scandals which involved the Washington administration resulted in great gains for the Democrats in 1874, so that by 1875 they controlled the lower house of Congress, and rendered further reconstruction legislation impossible. In 1875 and 1882 the Supreme Court declared portions of the Enforcement Acts unconstitutional, and these acts in their entirety were repealed. The court has held that the Fourteenth and Fifteenth amendments can be invoked only against violations by States, not by individuals. Thus the whites were left freer to eliminate or control the negro vote. Results of reconstruction, however, such as the negro's civil rights and the Southern public-school system, which was mainly a product of this period, still stand.

**Reconstruction**, a term used to denote social, economic, and political change incident to and following on a war period. Such problems are: the demobilization of the military forces; demobilization of war industries; problems of the peace settlement; disbanding of emergency instruments of government established under the war power; re-education of disabled soldiers; replacement of soldiers

and civilian war workers in industry; disposal of war stores; cancellation of war contracts; war-debt taxation; re-establishment of shipping on a commercial basis; deflation of the currency; re-establishment of credit on a normal foundation; normalization of the supply or source of raw materials. After the World War of 1914-1919, France was the first country to make provision for the study of after-war problems. In 1915 the Ministry of the Interior established a department to consider the needs of the invaded regions. Great Britain achieved, even under the handicap of war conditions, a wise, thoroughgoing and reasoned program for meeting the conditions of the new peace era, beyond the record of any of the sister states, either allied or enemy. The inspiration, and in many cases the form of the reconstruction proposals of Germany, are to be found in the documents of the British Ministry of Reconstruction, and labor reform the world over acknowledges its debt to the reports and investigations of the same ministry. In the U. S. important reconstruction activities are apportioned to the Federal departments of War, Treasury, Interior, Post Office, Agriculture, Commerce, Labor, and State, and to various administrative boards. The National War Labor Board, Food Administration, Fuel Administration, Railroad Administration, and the U. S. Housing Corporation preserved for a time in the reconstruction period most of their war activities.

Called by the United States Chamber of Commerce, there assembled at Atlantic City on Dec. 3-6, 1918, a Reconstruction Congress of American Industry which, at the instance of John D. Rockefeller, Jr., adopted an industrial creed to express the general sentiment of American business. The voice of labor on reconstruction is heard in the Reconstruction Programs of the American Federation of Labor and of a number of State and city federations. Of all these programs that of the national body is the most conservative. In general the demands of the State federations of labor were more radical than those of the national body. The chief difference is in the amount or degree of nationalization of industry demanded. The excess of production over consumption was valued at over twenty billions of dollars in 1918 as compared with six and one-half billions in 1913. 'The final results of the adoption of a general policy of maximum production would be a decided increase in the productive capacity of the capital invested, a

great improvement in the relations between employer and employed, a scientific standardization of production based on the reckoned demand and supply over long periods of time, beyond what the public would have thought of, as conceivable.' Investigations were set on foot to determine the extent of profiteering, and such other elements in the situation as might be susceptible of improvement. Education was profoundly influenced by the war. The practical adaptation of vocational methods of training to the vital needs of industry for skilled direction by trained executives and skilled labor, brought about an entire change of front on the part of organized labor towards education. It aimed to bring about (1) a general high level of patriotic, intelligent and competent citizenship; (2) Americanization of the un-American, both native and foreign; (3) a complete abolition of illiteracy; (4) the use of English as the universal language; (5) a high degree of physical and moral fitness; (6) an adequate and effective system of public education, both national and State, as the chief agency for the accomplishment of the above ends; (7) a readjustment of elementary and secondary education so that adequate provision might be made for the four great ends of all education—health, citizenship, occupation, and leisure.

**Reconstruction Finance Corporation (RFC)**, a government-owned corporation designed to provide emergency financing facilities for financial institutions, to aid in financing agriculture and commerce, and for similar purposes. The keystone of his recovery program, President Hoover recommended to Congress the creation of the Corporation on Jan. 4, 1932. He signed the bill, which closely followed his recommendations, on January 21. This established the Corporation; empowered it to issue \$500,000,000 of capital stock, all to be taken by the Federal Treasury; vested its management in seven directors—the Secretary of the Treasury, the Governor of the Federal Reserve Board, the Farm Loan Commissioner, and four Presidential appointees (term two years), not more than four of the entire number to be of one political party. The life of the Corporation was to be ten years, unless terminated earlier by statute. It was authorized to make loans to any bank, savings bank, trust company, building and loan association, insurance company, mortgage-loan company, credit union, Federal Land Bank, Joint-Stock Land Bank, Federal Intermediate Credit

Bank, agricultural credit corporation, life stock corporation, organized under the laws of any State or of the United States, including loans on the assets of any closed banks; also with the approval of the Interstate Commerce Commission, to railroad companies and railroad receivers. Loans were to be 'fully and adequately secured.' Especially to facilitate its assistance to the smaller banks, the Corporation soon created regional committees to collaborate with it. Popular demand grew that the Federal Government should do for State and local governments, for individual distress and for unemployment relief what the R. F. C. was doing for the banks and railroads. Accordingly altered, and signed on July 21, the Emergency Relief act authorized the Corporation to increase its capital by \$1,800,000,000, its resources thus consisting of its original \$500,000,000 subscription by the government and the receipts from sales of debentures that might total 6 3-5 times this amount, or \$3,300,000,000. Of the additional \$1,800,000,000, \$300,000,000 was to be lent to States, at 3 per cent. interest, for immediate urgent relief, with or without security. The act also provided for the removal from the Corporation's directorate of the Governor of the Federal Reserve Board and the Farm Loan Commissioner.

Loans by the Corporation to banks and railroads were of great, though of course incalculable, aid in averting bankruptcies and receiverships. In August, following a provision of the Emergency Relief act, the first list of borrowers from the Corporation was made public, and monthly thereafter. In May, 1933, President Roosevelt appointed Jesse Holman Jones of Texas as chairman of the board of the R. F. C. Under the Roosevelt Administration many of the powers of the Corporation were curbed, and it became the fiscal agent rather than the administrator for new relief measures, as under the Wagner Act for aid to States, the Farm Credit Administration, and the National Recovery Act. See U. S. HISTORY, NEW DEAL.

**Reconstruction, Surgical.** As a result of the World War (1914-18), there returned to various communities, all over the world, men who had received injuries in battle, resulting in disabilities which might remain permanent or be improved by surgical interference and subsequent training.

Surgical reconstruction upon soldiers and sailors presents few problems differing from the same work upon civilians, except that

the disabilities of the former are due to shrapnel and gunshot wounds, and the vast majority of their wounds are severely infected, a condition which frequently influences the surgeon to wait months before attempting to operate upon the deformed or disabled part because of the danger of stirring up the old septic condition.

Experience with the physical treatment in distinction to the purely surgical or operative treatment of the vast numbers of wounded in the World War has led to the technical subdivision of the subject into three parts as follows: (a) Functional Re-education, by which is meant not alone the re-training of partially injured muscles and nerves, but the heightening of function in normal limbs, as where a man whose right arm has been shot off is trained to use the left arm through a much wider range of functions than it was formerly accustomed to exercise, (b) Occupational Therapy, by which the convalescent is given useful employment with his hands, as basket making, leather stamping, toy making, plasterine modelling, etc.; (c) Vocational Training, which consists in the adaptation of the disabled patient to a new trade or vocation, or in his restoration to the trade or vocation which he originally followed.

It is the policy of the U. S. Government that no member of the military service disabled in line of duty shall be discharged from service until he has attained as complete a recovery as is possible in view of the nature of his disability. In order to attain this object certain army hospitals have been especially designated as reconstruction hospitals and have been equipped and staffed, either throughout or as to one or more wards, for special work in cardiovascular diseases; tuberculosis; neurological and other head surgery cases, orthopedics; amputation; insane cases; war neurosis (and other neurological cases); blind, deaf, and speech-defect cases; general medicine; general surgery; and other specialties.

**Record**, in law, may be briefly defined as an official statement or narrative of a public act or proceeding, e.g. of a constitutional or legislative measure, a judicial suit or a transmission of real property.

**Recorder**. In England, a judge of the court of quarter sessions. In the United States the term is applied to judges of certain criminal courts and in some States to the public official who has custody of records of title and other public records, and attends



to the recording of instruments of title.

**Recorder**, the name of an old musical instrument somewhat like a flageolet.

**Recorder, Siphon**, an instrument invented by Lord Kelvin to produce a permanent record of the variations of the extremely minute currents by which the signals of submarine cables are effected.

**Recording Acts**. Statutes providing for the recording in public offices of instruments affecting title to property and other documents, for the purpose of giving notice of their existence and nature to the public. In all States of the United States there are statutes providing for the recording of deeds, mortgages, leases, wills, and other instruments of title, including releases or satisfactions of mortgages, and liens, assignments of leases and mortgages, etc.; also mechanic's liens, *lis pendens* in actions affecting title to property, powers of attorney, and all liens affecting real property. Chattel mortgages and conditional bills of sale may be recorded or filed in public offices in most States. In other words, one who relies upon the public records is protected against secret conveyances.

**Records, Public**, any written or printed matter containing accounts or memorials of acts, transactions, and facts of a public nature, and preserved for the benefit of the public. All legislative acts; communications from the Chief Executive to Congress, or of the governor to a legislature; court proceedings; books and accounts of public officials; minutes of proceedings of public officers and boards, of legislatures, and of Congress; official maps; weather bureau records; patent records; and documents filed or recorded in public offices, are public records. Judicial records are carefully preserved; and all instruments filed or recorded under the Recording Acts are public records. In most of the United States, public records are generally open to inspection by any one under reasonable regulations, regardless of interest, and usually free of charge. Official copies may also be obtained on payment of certain fees.

**Recovery of Land**. Possession of real estate entitles a person to hold it until he is legally ousted. Many States have statutory 'summary proceedings' for ousting tenants; but generally an action in a superior court of record is necessary if a question of title is involved.

**Rectangle**, in mathematics, is a plane quadrilateral figure having all its angles right

angles. Its area is equal to the product of the lengths of two adjacent sides.

**Rectification**, in mathematics, is the process of finding a right line equal in length to an arc of a curve, or of expressing that length. It is effected by integration between limits obtained by curve tracing. The length of any curved line may be found practically by running a wheel along it, and noting the number of revolutions; an instrument for doing this is called an opisometer.

**Rectification**, in astronomy, is the adjusting of a celestial or terrestrial globe for the solution of a given problem.

**Rectifying**, a process applied to alcohol, chloroform, or other volatile liquid, by which the last traces of impurities are removed by distillation.

**Rector**. In the Episcopal Churches of the United States all incumbents are called rectors. The title is also sometimes given to the head of a college or school.

**Rectum**, or **Anus**, is the potential opening at the lower end of the alimentary tract, which is normally closed, save during the voiding of excreta, by the involuntary muscle, the sphincter ani. (See **INTESTINES**; **ANAL GLANDS**.)

**Red**, one of the three primary colors (see **COLOR**), appearing at the end of the spectrum opposite the violet end (see **SPECTRUM**). Red pigments are obtained from the mineral, vegetable, and animal kingdoms.

**Red Bank**, town, Monmouth co., New Jersey, at the head of navigation on the Shrewsbury River, 27 m. s.w. of New York City, with which it has steamboat connection. The town is a popular summer resort. Manufactures include canning factories, gold-beating works, iron foundry, carriage shops, clothing, cigars, and brushes; p. 10,974.

**Red-bellied Snake** is the name for several varieties or harmless snakes with red ventral surfaces. The best known is the *Storeria occipitomaculata*, or **Wampum Snake**, found in the Eastern half of the United States.

**Red Bird**, a common name in various countries for different birds of conspicuous red plumage. In the Southern United States it is a popular name for the Cardinal Bird; in the Northern United States, for the Scarlet Tanager.

**Redbreast**, or **Robin** (*Erithacus rubecula*), a small, bold, and familiar European bird, allied to the minor thrushes, which is everywhere protected on account of its

friendly ways and legendary associations. The American robin is a namesake of this bird, but very different, the nearest American ally of the English redbreast being the bluebird.

**Red Bug**, one of various minute red harvest mites in the Southern United States that burrow in the human skin, causing intense irritation.

**Red Cross Societies**, national societies established primarily for the aid of the sick and wounded in time of war, recognized and authorized by the military authorities and enjoying certain privileges and immunities un-

gestion. The Committee of Five issued an invitation to all the European governments as well as to military, medical and philanthropic notabilities to attend an international conference to be held at Geneva on October 26, 1863. Thirty-six delegates, including representatives of fourteen nations and six charitable and benevolent societies, responded to the call; a proposed code of international enactment was discussed; and resolutions were adopted. The convention was revised in 1906, and its terms were extended to naval warfare by the Hague Convention (1899). Although the convention which made possible the Red



*Red Cross in Action.*  
Registering Earthquake Refugees.

der the treaty known as the Geneva Convention. The Red Cross movement may be said to have had its origin in the Battle of Solferino, in the Italian War of 1859. It was first conceived by Henri Dunant of Geneva, who witnessed the battle and who, in *Un Souvenir de Solferino*, graphically described the sufferings of the wounded soldiers. The *Souvenir de Solferino* was read throughout the world and this suggestion caught the attention of a Genevese lawyer, Gustave Moynier. Monsieur Moynier appointed a committee of five from the *Société d'Utilité Publique* to consider plans and methods embodying Dunant's sug-

Cross movement was necessarily international, the relief societies themselves are entirely national and independent, each one governing itself and making its own laws, and each central committee being charged with the direction and responsibility of the work in its own country. At Paris the League of Red Cross Societies maintains a permanent secretariat, which serves as an information centre for the Red Cross societies of the world, and from it publishes monthly a bulletin, *The World's Health*.

In 1869 Miss Clara Barton met in Geneva, Switzerland, the founders of the Red Cross,

who urged that she try, on her return to the United States, to secure the adhesion of the U. S. Government to the Treaty, so that an American Red Cross society might be formed. In July, of the same year, 'The American Association of the Red Cross,' with Miss Barton as president was incorporated under the laws of the District of Columbia. In June, 1900, the American Association was reincorporated by Act of Congress as the American National Red Cross. The old Association of the Red Cross was dissolved in the autumn of 1904 and a new charter providing for a complete change of organization was granted by Congress and approved on January 5, 1905, by President Roosevelt. The purposes of the American Red Cross, as defined by the charter of 1905, are 'to furnish volunteer aid to the sick and wounded of armies in time of war; to act in matters of voluntary relief . . . as a medium of communication between the people of the United States and their Army and Navy . . . ; and to continue and carry on a system of national and international relief in time of peace and to apply the same in mitigating the sufferings caused by pestilence, famine, fire, floods and other great national calamities and to devise and carry on means for preventing the same.' The governing body of the American Red Cross is its Central Committee, which is composed of 18 members, six of whom are elected by the Board of Incorporators and six by the representatives of Chapters. The other six are appointed by the President of the United States and include the chairman of the Central Committee and representatives each from the Departments of State, War, the Navy, Justice and the Treasury. In the United States in time of peace, the American Red Cross conducts public health nursing services, offers class instruction, and carries on routine service in disasters of various types. A traditional and outstanding duty of the society, one which continues in peace and war, is to render relief to victims of disaster.

**Red Deer** (*Cervus elaphus*), a large and handsome animal, formerly distributed throughout Europe, and extending into Northern Africa, and over a large part of Asia. Closely related to the true red deer are a number of Asiatic forms; and these connect the species closely with the North American wapiti.

**Redemption**, in law, the right of a person whose property has been sold to satisfy a

lien, to receive it back upon payment of the amount due, interest, and costs. It is a purely statutory right, and the terms vary in different States.

**Redemptorists, Congregation of the, or Liguorians**, a Roman Catholic order of missionary priests, founded by Alphonsus Liguori at Naples in 1732. On the suppression of the Jesuits in 1773 the Redemptorists assumed a large part of their labors, and by the early part of the 19th century the order had spread throughout Europe, North and South America, and Australia. It is devoted to missionary work, principally among the poor and ignorant, its chief instruments being preaching and the education of the young. The order is divided into 19 provinces and 10 vice-provinces. There are two vice-provinces in the United States, with headquarters in Baltimore and St. Louis. St. Alphonsus also founded the *Redemptoristines*, a contemplative order of nuns, which now has convents in Italy, Austria, Holland, Belgium, and France.

**Redfield, William C.** (1780-1857), American scientist and railway promoter, was born in Middletown, Conn. He was a pioneer in the introduction of steam ferries, railroads, and street railways. He took a keen interest in meteorology, and demonstrated that storms were eddies circling round regions of low pressure.

**Redhead Duck**, a species closely resembling the canvasback duck. The Redhead abounds throughout the waters of North America, except on the North Atlantic Coast, where it is rare.

**Redlands**, city, California, San Bernardino co., at the head of the San Bernardino Valley. It is situated among beautiful mountain scenery, and is a favorite pleasure resort and residential city. The city is the center of one of the finest fruit-growing districts in the State, noted especially for its oranges, and is a shipping point for citrus fruits and olive oil; p. 14,324.

**Red-letter Days**, days specially set apart by the Roman Catholic Church for the more important festivals, so called because they were indicated in the calendar in red-letter characters.

**Red Men, Improved Order of**, a fraternal and benevolent organization, characterized as the oldest charitable and benevolent secret society of American origin founded on aboriginal American traditions and customs. One of the chief objects of the Red Men is

the preservation of the history, customs, legends, and names of the aboriginal Indians. It has about 17,000 members.

**Redmond, John Edward** (1851-1918), leader of the Irish Nationalist Party, was born in Waterford. During the Home Rule agitation of the eighties he became one of the trustiest followers of the Irish leader, C. S. Parnell, and as Irish whip rendered great service to the Irish members. When his party split after the Parnell scandals he became the chief spokesman of the Parnellites, the minority who still recognized the old leader, and in 1891 became himself accredited leader. He is well known in America, having made several tours in the United States and Canada to collect funds for his party. Under Redmond's leadership the Home Rule Bill was brought to successful passage in 1915.

**Redoubt**, in military science, is a work entirely enclosed by a parapet of earth. Redoubts may be used as supporting points in a second line of defence, or as detached posts or posts in lines of communication, and should be traced to support one another, as they have no ditch defence.

**Redpath, James** (1833-91), American journalist and reformer, was born in Berwick-on-Tweed, England, and migrated with his family to America. In 1851 he entered on a journalistic career, and the next year journeyed through the South investigating the slavery question, becoming a firm Abolitionist. He represented the New York *Tribune* in the Irish famine of 1881 and founded *Redpath's Weekly* (1881-3) to promote the Irish cause. He was editor of *The North American Review*, and published *John Brown the Hero* (1862); *Talks About Ireland* (1881).

**Redpoll**, a small finch of the genus *Acanthis*, found in temperate and northern regions, allied to the linnet; so named from the patch of red on the head of the male bird.

**Red River**, the most southerly of the great tributaries of the Mississippi River, so named from the muddy appearance of its waters, due to its load of reddish clay. It forms the boundary between Texas on the south and Oklahoma on the north, and in this middle course flows through wide stretches of fertile lands. The lower part of the river valley is a low flood plain, with levees, bayous, clogged channels, and meandering course, and is subject to occasional floods. It joins the Mississippi River oppo-

site the southwest corner of Mississippi, 340 m. above the Gulf of Mexico.

**Red River, Red River of the North**. For the first 100 m. it flows southward through drift hills and numerous lakes; then westward and northward through the great level plain of the Red River Valley, forming the boundary line between Minnesota and North Dakota; and enters Manitoba, emptying into Lake Winnipeg. The *Red River Valley* is a noted wheat region.

**Redroot**, the popular name for various plants. (1.) The common Redroot of North America (*Ceanothus americanus*), which abounds from Canada to Florida, is a shrub of two to four feet high, with beautiful thyrsi of numerous small white flowers. (2.) Another well-known American Redroot, found in marshy ground along the Atlantic, is *Gyrotheca tinctoria*, with sword-shaped leaves, a compound cyme of woolly flowers, and a red root.

**Red Sea, or Arabian Gulf**, an extensive inland sea lying between Africa and Arabia. It is about 1,200 m. long and 100 to 200 m. broad in its central portion, narrowing toward the southern extremity. The area is estimated at 160,000 sq.m., and the average depth from 100 to 400 fathoms. The Gulf of Suez extends for 190 m. in a northwesterly direction, and communicates through the Suez Canal with the Mediterranean Sea. The coasts of the Red Sea are generally low, flat, and sandy, devoid of vegetation, and bounded in the distance alternately by low land and high, bald mountain ranges running parallel with the coast. The Red Sea was an important means of intercourse between Europe and Western Asia and the East in ancient times. Its commerce declined after the discovery of the passage around the Cape of Good Hope, but has been largely restored since the opening of the Suez Canal (see *SUEZ CANAL*). Mokha, Hodeida, Lohela, Jeddah, and Yambo on the Arabian coast, and Suez, Kosseir, Suakin, and Massowah on the African coast, are the chief seaports.

**Redstart**, a common and familiar American warbler (*Setophaga ruticilla*), conspicuous in a plumage of black, with deep red patches on wings and tail; this is the male—the female is brown and yellow in a similar pattern.

**Reducing Agents**, substances that remove oxygen, chlorine, and similar elements from compounds, sometimes introducing hydrogen as well. Of the elements, hydrogen, aluminum,

and carbon are typical reducing agents.

**Reductio ad Absurdum**, an indirect method of disproof by showing that the proposition to be disproved necessarily involves consequences which are impossible or absurd, in which case the proposition itself must be erroneous.

**Reed**. (1.) In musical instruments. Certain wind instruments have their sounds produced by the vibration of a reed or thin tongue of elastic material, fixed at one end in such relation to a slot that a current of air passing through the orifice causes the free end of the reed to vibrate. In organs the reeds are usually made of brass or some other metal; but those of the clarinet, oboe, and bassoon are invariably constructed from the outer layer of the *Arundo sativa*, a variety of tall grass. Organ reeds differ from all others in method of construction. (2.) In botany, the common name of several tall grasses of the genera Phragmites, Arundo, etc., usually growing in wet or marshy places, and by the banks of rivers and stagnant waters. (3.) In weaving, an instrument somewhat like a comb, made up of parallel slips of metal or reed called 'dents,' which are fixed into two parallel pieces of wood.

**Reed, Joseph** (1741-85), American patriot, born at Trenton, N. J. In 1778, as a member of the Continental Congress, Reed signed the Articles of Confederation. He was one of the founders of the University of Pennsylvania, and an active advocate of the abolition of slavery.

**Reed, Thomas Brackett** (1839-1902), American politician, born at Portland, Me. He was a prominent candidate for the Republican presidential nomination in 1896. He was a most efficient presiding officer, and his rule as to counting a quorum, although arousing bitter antagonism at the time, has since been followed by both parties when in control of the House.

**Reed, Walter** (1851-1902), American bacteriologist and pathologist, discoverer of the method of transmission of yellow fever, born in Va. After service as interne in Brooklyn City Hospital, and in Charity Hospital, Blackwell's Island, he was appointed a district physician in N. Y. city in 1892. In 1898 he became the head of a commission appointed to study the cause and method of propagation of typhoid fever, when that disease was devastating the camps of the volunteer armies of the U. S., at the outbreak of the Spanish-American War. In June, 1900,

he began special work in Cuba, as president of a commission to study infectious diseases, especially yellow fever. By means of experiments upon soldiers who volunteered for the purpose, Reed demonstrated in 1901 that infection of yellow fever does not pass from the clothing, personal contact, or vomited matter; but that through the bite of the mosquito known as *Stegomyia fasciata* alone is the disease propagated. A slight but lasting tribute has been paid to Reed in naming after him the new Army General Hospital at Washington.

**Reed, William Bradford** (1806-76), American politician and journalist, was born in Philadelphia. In 1857 he became minister to China. Upon his return in 1860 he became American correspondent of the London *Times*, and was active in New York city politics.

**Reeder, Andrew Horatio** (1807-64), first governor of Kan. Territory, born at Easton, Pa. Pressure was brought to bear against him at Washington by Southern politicians, and he was removed from office after holding a little more than a year. In July, 1856, he was also chosen United States senator by the Topeka legislature, but as the territory was refused statehood, he did not take his seat.

**Reef, or Shoal**, is defined by an International Geographical Congress Committee as a submarine elevation which reaches to within 11 fathoms of the surface, and so is dangerous to shipping.

**Reefing**, the process of reducing the area of a sail.

**Reel**, a dance, danced by two or more couples. The Virginia reel, well known in the U. S., is a form of the Sir Roger de Coverley of Great Britain.

**Rees, John Krom** (1851-1907), American astronomer, born in New York. In 1884 he became professor and director of the Columbia University Observatory. In 1900 he was U. S. juror on instruments of precision at the Paris Exposition, and delegate to the conference on photographing the atlas and to the congress on chronometry.

**Referendum**, the political institution by which laws are submitted to a vote by the people, after they have been sanctioned by the legislature, and before they become part of the statute book. Together with the initiative, the referendum secures the direct right of legislation to the people, and therefore represents the most advanced stage of

democracy. In the diplomatic sense of *ad referendum* the institution prevailed in the two Swiss confederations of the Grisons and of the Valais. In the United States, about 1890, a great deal of popular interest in the Swiss referendum developed. The introduction of this system was one of the demands of the Farmers' Alliance, and later, of the People's party. It was believed that in this way it would be possible to remove legislation from the control of party politicians. The principle of the referendum had, however, been employed at a much earlier time in the form of submission of constitutions, and amendments thereto, to popular vote. The first case of a referendum of this kind was in 1778, when the legislature of Massachusetts submitted a constitution to the people making a two-thirds majority necessary for ratification. After 1840 the adoption of a constitution by a new state, or of a new constitution by an old one, was regularly carried through by referendum, until 1890, when Mississippi framed a new constitution which was not submitted to the electors. The precedent of Mississippi has since been followed, and for the same reason, by several other states of the South. In the amendment of constitutions a wide field for the referendum has been opened. In many states a tendency has appeared for the legislature to refer to the people for popular vote under the form of constitutional amendments subjects on which the legislature is quite competent to enact laws. The referendum has frequently been employed to secure the decision of the people on statutes not cast in the form of a constitutional amendment.

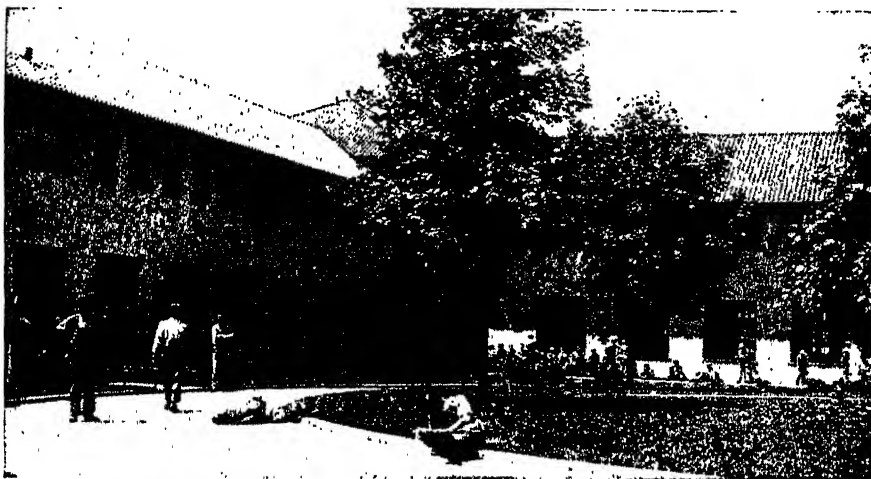
**Reflection and Refraction of Light**, because of their intimate connection, are best treated together. When a ray of light falls upon the boundary of two transparent media, it is in general broken up into two rays. The one is turned back into the original medium, and is called the reflected ray. The other proceeds through the second medium usually with a change of direction, and is called the refracted ray. The laws of simple reflection and refraction are made the basis of what is known as geometrical optics, which includes the discussion of the properties of reflectors, mirrors, lenses, microscopes, and telescopes. Newton's great discovery that the refractive index of a substance is not the same for the differently colored constituents of white light is treated under **DISPERSION, COLOR, and SPECTRUM AND SPECTROSCOPE**.

The simple laws of refraction hold for homogeneous isotropic transparent bodies like glass and water; but when the transparent substance is not isotropic, as is the case with the most crystalline substances, there is a second refracted ray, which does not in general lie in the same plane with the incident ray and the normal. This so-called extraordinary ray follows a different law of refraction. The result is that, when the eye looks through such a crystal in a suitable direction, two distinct images of a single object are seen. This is the phenomenon of double refraction, and is especially characteristic of the crystal Iceland spar. It is closely associated with the phenomenon of polarization of light.

**Reformation**, the ecclesiastical revolution in the 16th century by which a considerable number of European states severed themselves from the Roman Catholic Church and adopted some form of Protestant belief and organization. At the beginning of the 15th century it might have been possible to reform the worst abuses of the church and yet retain its unity and cohesion. By the beginning of the 16th century this was no longer possible; hence the most essential characteristic of the Reformation. It was no longer a constitutional movement for the enforcement of stricter discipline or for the imposition of restraints upon what in the minds of many had come to be looked upon as papal despotism; it was a series of national or quasi-national rebellions against an ecclesiastical system which was ill suited to altered political conditions. It was in Germany that the first decisive blow was struck. Martin Luther, the son of a miner, who had become a monk, startled the world by publishing in 1517 the famous theses in which he attacked the so-called sale of indulgences, and the whole fabric of dogmatic teaching on which the granting of indulgences is based. The episode might have been of merely local importance but for the attempt of the papacy to suppress one whose audacious views were so radically opposed to the received doctrines and practices. By 1520 the attention of Western Europe was concentrated upon the quarrel between the papacy and the monk of Wittenberg. When the Diet of Spire sought to re-enact the edict of Worms, the Lutheran princes made the famous 'protest' which gave them a new and lasting name. Their creed was enunciated in the Confession of Augsburg (1530), and they

coalesced for its defence in the League of Schmalkalden (1531). A new war began in 1551, in which the Protestants had assistance from France; and by the 'Peace of Religion' signed at Augsburg, in 1555, the principle was established that each prince should determine the religion of his own subjects. In Switzerland an independent movement, nearly contemporary with that of Luther, was headed by Ulrich Zwingli, who brought to the study of the Scriptures the independent critical spirit of the trained scholar. By 1525 Zwingli had gained a complete ascendancy in Zürich, and the municipal council repudiated the spiritual authority of the bishop of Constance. From Zürich the

and distinct church organizations—the Lutheran and the Calvinist or 'Reformed'; and these still remain the two main branches from which numerous later offshoots have sprung. The Reformation in England is unique in that it began with a revolution in the constitution of the church without any change of doctrine, and ended in a compromise which was neither Lutheran nor Calvinist, and in many respects retained more continuous connection with the old church than would have been admitted by either of the great Continental reformers. In 1593 the Confession of Augsburg was definitely adopted by a synod at Upsala as the creed of the Swedish Church, and under Gustavus



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*Warrenville Reformatory, Cleveland, Ohio.*

Zwinglian reformation spread to Bern, Basel, and other Swiss cantons, and even threatened to supplant Lutheranism in several towns of Southern Germany. The importance of the Swiss reformation was soon overshadowed by the rise of a new leader, John Calvin, whose teaching was not unlike that of Zwingli, and whose work was carried on in Geneva. Of the Protestant Church in Geneva, Calvin, in spite of opposition which drove him into exile at Strassburg for three years, became the guide and ultimately the dictator. Calvin ruled the city of Geneva because he was supreme in the church. Church and state were identical, and therefore intolerant.

Thus by the middle of the 16th century Protestantism had produced two well-defined

Adolphus, Sweden became the vigorous champion of the Protestant cause in the Thirty Years' War. In Denmark the Reformation, though equally the work of the monarchy, was accompanied by more strife and disorder than in Sweden. The complete victory of Christian in 1536 brought with it the success of the Reformation. For thirty years France was distracted by a series of religious wars, divided by brief intervals of uneasy peace. The most famous incident of the struggle was the massacre of St. Bartholomew in 1572. At last peace was made by Henry IV. (1589-1610), the son of Anthony of Bourbon. He obtained national recognition of his title by abjuring the Protestant faith, while he gave toleration to the Huguenots by the Edict of Nantes (1598).

But the settlement was not lasting. Richelieu withdrew the political concessions which made the Huguenots too independent, and Louis XIV. revoked the edict altogether (1685). The Reformation failed in France because it was identified with aristocratic privilege and municipal isolation, and thus came into collision with that passion for unity which has always characterized the French nation. In Scotland the Reformation gave rise to even more prolonged strife than in France. But finally in 1560 Parliament abolished the mass and approved a Calvinist confession of faith. John Knox aspired to become the Calvin of Scotland, but in 1561 Mary Stuart, who had been left a widow by the death of Francis II., returned to Scotland, and strove to modify the still incomplete settlement of 1560. Her reactionary policy was, however, futile. The victory of Protestantism was now secured; but there was a long struggle as to the organization of the church. John Knox and Andrew Melville strove for Presbyterianism and spiritual independence, while James VI. and his successors were resolute to maintain Episcopacy and secular control. The result was the National Covenant (1637), which restored Presbyterianism in Scotland. Presbyterianism was finally established by law in 1690.

Whereas in Scotland the Reformation was mainly a popular and an aristocratic movement, in England its origin and course were to a large extent determined by the monarchy and by political considerations. The desire for a male heir and alienation from the Emperor Charles V. urged Henry VIII. to seek a divorce from Catherine of Aragon. On the Pope's refusal to grant the divorce, Henry carried through Parliament a series of measures which severed the English Church from Rome, established the ecclesiastical supremacy of the crown, and enabled the king to despoil the monasteries of their wealth. But these changes were purely constitutional, and did not affect the dogmas or ritual of the church. Under Edward VI. the government fell into the hands of nobles, who enriched themselves with the spoils of the church. The result was that the royal supremacy was employed to carry the Reformation to lengths for which public opinion was unprepared. The old Latin services were superseded by an English liturgy; the clergy were allowed to marry; images and other ornaments in churches were condemned as idolatrous. A violent reaction followed

under Mary, who restored the old form of worship and the authority of the papacy. Fortunately for the Protestants Mary died childless; and Elizabeth in 1559 again repudiated papal authority by the Act of Supremacy, and restored the English Prayer Book by the Act of Uniformity. In 1570 the creed of the church was determined by the promulgation of the Thirty-nine Articles. In Ireland Henry VIII. had no difficulty in establishing, in what was regarded as a mere dependent province, the ecclesiastical revolution that he had already wrought in England. Thus Protestantism prevailed for the most part among the Teutonic peoples of Northern Europe; whereas Roman Catholicism was retained by the Romance peoples of the South and in those parts of Germany which had once belonged to the old Roman Empire. The so-called counter-reformation was as much a part of the Reformation as were those Protestant secessions which usually monopolize the name. The evils and abuses which had incurred such merited opprobrium at the close of the Middle Ages were swept away by reforming popes and by the Council of Trent, which sat with intermissions from December 1545 to December 1563.

**Reformatories**, institutions for the correctional treatment of first-time offenders, with the object of reformation rather than of punishment. With respect to the age and presumed criminality of the offender, the reformatory stands between the penitentiary and the juvenile reform school. The reformatory system has had its greatest development in the United States and forms an interesting illustration of the evolution in penology. The first American juvenile reform school was opened in 1825 on Randall's Island, New York City, as a private philanthropical institution. The first reform school supported wholly by public taxation was opened in Westborough, Mass., in 1847.

In 1876 the New York State Reformatory at Elmira was opened. Since that time 15 other reformatories patterned in essential features after the Elmira institution have been erected. It is estimated that in almost every reformatory, as at present conducted from 15 to 20 per cent. of the inmates are habitual criminals, a menace and corrupting influence to the remaining 80 per cent., of whom some 10 per cent. are likely to be feeble-minded. Reformatories for female offenders are conducted on similar lines as those for male.



**Reformed Churches**, those Protestant bodies which are, in their standards and confessions, markedly Calvinistic, and which, generally speaking, adhere to the presbyterian in preference to the episcopal form of church government.

**Reformed Church in America, The**, a body of Protestant Christians in the United States, known until 1867 as the Reformed Protestant Dutch Church; composed originally of settlers from the Netherlands. The first church was organized by Jonas Michaëlius on Manhattan Island in 1628, and the first church edifice was erected in 1633. It is a distinctively Calvinistic body. The polity is Presbyterian. The government of the local church is under the control of a consistory, comprised of the elders and deacons; deacons and pastors from individual churches make up the classes for a district; Particular (provincial) Synods and the General Synod, the highest court of the church, complete the ecclesiastical organization.

**Reformed Church in the United States, The**, known for many years as the German Reformed Church, traces its origin to German, Swiss, and French families who settled in America in the 18th century. They established themselves in the South, in New York, and in Pennsylvania, and being generally religious in character, soon organized churches. At length, after a period of controversy, a number of churches withdrew to form the Synod of the Free German Reformed Congregations of Pennsylvania, later known as the German Reformed Synod of Pennsylvania and Adjacent States. In doctrine and polity the Reformed Church in the United States is wholly in accord with the Presbyterian Church.

**Reformed Episcopal Church**, a religious body organized, in the city of New York, Dec. 2, 1873, under the leadership of Bishop George David Cummings, D.D., Protestant Episcopal bishop of Kentucky, to perpetuate the old evangelical or 'low' tendency, as opposed to ritualistic teachings, in the Protestant Episcopal Church. It differs from the present Protestant Episcopal Church fundamentally in government and doctrine. The highest governing body is a General Council of clerical and lay deputies meeting triennially. The bishops do not sit separately, as in the Protestant Episcopal Church, and are elected by the General Council and not as diocesan conventions. It does not require confirmation, though practising it, and al-

lows open communion. The Prayer Book looks for its foundation to the second Prayer Book of Edward the Sixth, compiled principally by Archbishop Cranmer, which was an evangelical or low-church revision of the first Edwardine Book set forth in 1549.

**Refrigerants**, in medicine, are means for lowering the body temperature and relieving thirst. Baths, wet packs, and sponging are external refrigerants; and fluids in general, whether taken by the mouth or injected into the bowels, tend to cool the body.

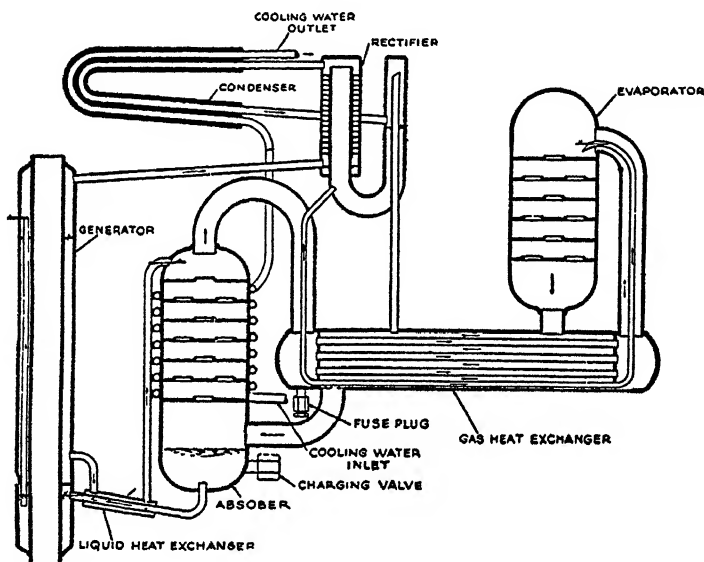
**Refrigeration** is the act of reducing the temperature of a substance to a point lower than the surrounding environment. It may be produced by processes either primarily chemical or primarily mechanical in nature. In the first class, melting ice, mixtures of salt and ice, and mixtures of various soluble salts and water, constitute means of producing cold. The second or mechanical class includes the compressed gas machines, compression machines in which the gas is condensed during the cycle, absorption machines, and vacuum machines. The ordinary household refrigerator, or ice box, constitutes the simplest refrigeration plant. There are two principal methods of producing refrigeration by compression machines, differing primarily in that the refrigerating medium is simply compressed and expanded in one case, whereas in addition to this, liquefaction and vaporization occur in the other case. In the first or cold air method, the air or gas is first compressed in a compressor and the heat generated is removed by passage through the tubes in water. The cold compressed air is then allowed to expand, working against a piston which absorbs heat, thus reducing the temperature. The chilled air or gas is then used as the refrigerating medium. In the second type of compression machine, the refrigerant, which has a low boiling point, passes through a cycle in which it is first compressed in a pump, then condensed by a cooling medium, such as air or water, and collected in a receiver, then vaporized in the refrigerating coils after passing a regulating valve and finally passing into the pump for use over again. Ammonia, carbon dioxide, sulphur dioxide, methyl chloride and ethyl chloride are the principal substances employed in refrigeration by this compression process.

In the absorption system a substance is used which is capable of absorbing large quantities of the refrigerant at low pressures and at the temperature of the cooling medi-

um available (cooling water temperature). On subsequent heating of such a substance it must also have the property of releasing the refrigerant at a pressure high enough to effect condensation at the temperature of the cooling medium. Aside from the absorption and liberation of the refrigerant the remainder of the refrigerating cycle, involving the condensation and expansion in refrigerating coils after passing a regulating valve, is essentially the same as used in the compression system. After expansion the gas is reabsorbed in the substance and the cycle

is considered a necessity in the household.

Electric refrigerating units are of the compression or machine type, and rapid progress has been made in the adaptation of the absorption system to the smaller sized units of gas machines. The simplification of the apparatus, freedom from moving and wearing parts, silent operation and availability of low cost fuels are inherent advantages of the absorption system. Ammonia is the principal refrigerant and both liquid and solid absorbents for ammonia are used in this system. Cold storage is the art of preserving



*Diagram of Ammonia Refrigerator.*

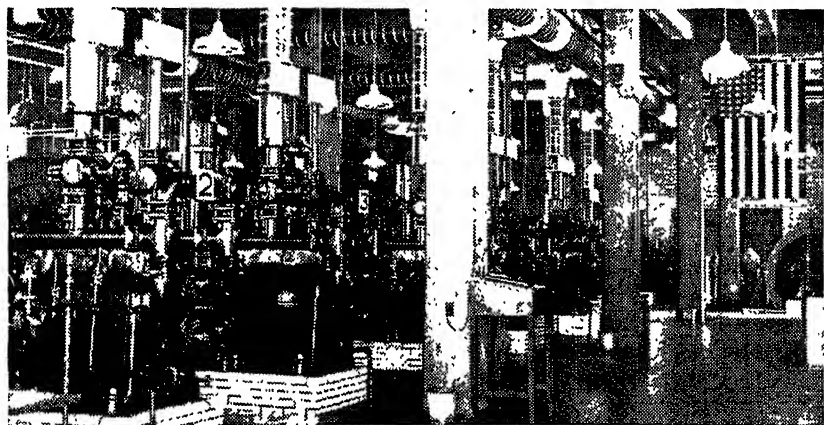
repeated. The largest application of the absorption system consists of the use of ammonia as a refrigerant and water as an absorbent substance. The second important factor in refrigeration is the insulation, by which heat is prevented from penetrating the walls and entering the cold storeroom. The insulating material must be light, porous, containing minute air spaces, odorless, of minimum capacity for moisture, vermin proof, non-inflammable and elastic to prevent settling. Until recent years the familiar household ice box has been the principal means of preserving food in the home. The advent of mechanical refrigeration rather than causing a decrease in the number of ice users, has stimulated the industry and today, more than ever before, refrigeration

articles of a perishable nature by keeping them in chambers constantly maintained at a low temperature. The refrigeration duty in cold storage may be divided into the following classes from which the total may be calculated. (1) Refrigeration to cool the goods stored. (2) Refrigeration to absorb the heat transmitted through the insulation. (3) Refrigeration to offset ventilation losses. (4) Refrigeration to absorb heat generated in the room. It is not uncommon to have as many as 100 different articles stored in a cold storage house, only a few of which can be considered. *Eggs* are among the most important products preserved by cold storage. *Butter* is stored for periods of three to six months. Cold storage of *fruits* is designed to arrest the ripening process and to retard

the process of disease. Cold storage plays an important rôle in the modern *meat industry*. The fresh meat from the slaughter house is first cooled gradually in chilling rooms, to the temperature of the main storehouse. It then goes to cold storage, to await shipment, is later shipped in refrigerator cars, and is again held in cold storage by the wholesale dealer and in cold boxes or refrigerated show counters by the retailer, until its purchase by the ultimate consumer.

An interesting development of the cold storage industry is the storage of furs and woolen garments, rugs, carpets, hangings, etc., to protect them against injury from moths or other destructive insects. One of

tained; about this same time Lavoisier made use of ether in a refrigerating machine. In the period immediately following the first production of ice by mechanical means, many scientific principles were discovered which aided the investigators of refrigerating processes. Joseph Priestly (1774) succeeded in producing ammonia. Robert Boyle and Gay-Lussac discovered the properties of gases which are so important in refrigeration calculations, and Count Rumford proved that heat was a form of energy and not a substance, as formerly believed. An American engineer named Jacob Perkins, living in London, in 1834 designed and patented one of the earliest compression machines using ether



*Refrigerating Plant, at Bronx Terminal Market, New York City.*

the modern developments in refrigeration is the refrigerating car for the transportation of meat, milk, or fruit. The modern car is insulated with 2 to 3 in. of corkboard or equivalent insulation and at each end of the interior is an ice bunker reaching from the floor to the top, and containing ice or broken ice mixed with salt, depending on the temperature required. One of the earliest methods of cooling bodies below the temperature of the atmosphere was to construct a cave or cellar in the ground into which perishable foods were placed. In this manner in many localities it was possible to maintain temperatures of 50 to 60° F. Dr. William Cullen succeeded in forming ice artificially in 1755 by evaporating water by means of an exhaust pump. In this experiment the heat required to vaporize the water is withdrawn from the water remaining in the vessel with the result that freezing temperatures are ob-

However, it was not until 1861 that the first semi-practical compression machine was built and in 1874 Carl Linde's first successful compression machine using sulphur dioxide was completed. In 1858-60 F. Carre discovered the ammonia absorption process. The Carre machine was the first to obtain a foothold in the ice making industry in the United States. In 1863 the first machine was shipped through the blockade to Augusta by Mr. Bujac of New Orleans. This machine was not successful and it was not until 1865 that D. L. Holden successfully operated the machine and established its practicability. From that time on the progress made was rapid. See *The Principles of Mechanical Refrigeration* (1928).

**Refuse Collection and Disposal.** Municipal refuse includes those wastes incident to city life, other than sewage, that are generally held to be proper subjects for collec-

tion and disposal at public expense, or at least under municipal sanitary control. The most important classes of refuse are those kitchen and table wastes known as garbage, market and slaughter-house wastes, ashes, old paper, bottles and crockery, tin cans, old leather and rubber, and cast-off articles of apparel and furniture generally. The earliest method of refuse disposal, after general collections were introduced, was by dumping upon land or into water, either of which is liable to be a nuisance, while dumping garbage or mixed refuse upon future building sites may be an ultimate menace to health. Earth burial of garbage alone, where land in rural districts is available, may be a relatively cheap, as it is a thoroughly sanitary, means of disposal. Another method of treating garbage alone is by the reduction process practiced in New York, Philadelphia, Baltimore, Washington, and many other of the larger cities of the United States. The garbage, which must be deposited by the householder in separate cans, is removed by itself to the reduction works, where the grease is extracted and the remaining material is made into a fertilizer base. The usual alternative to garbage reduction is burning or cremation.

**Regalia**, the ensigns of royalty, including more particularly the apparatus of a coronation. The regalia, strictly so called, of England, with the exception of the vestments, are now exhibited in the Jewel-room in the Tower of London. Their total value is estimated at \$15,000,000.

**Regatta**. See **Rowing**.

**Regelation**. See **Ice**.

**Regeneration**, a theological term employed to denote the spiritual change involved in the act of becoming a Christian. It is probable that the theological usage of the term is based on the words used by Christ to Nicodemus, 'Except a man be born again, he cannot see the kingdom of God.'

**Regeneration of Lost Parts**, in biology, signifies the reproduction or renewal of portions of an organism which have been destroyed from one cause or another. The first detailed experiments known are those performed in about 1740 by the Abbé Trembley, who used the freshwater hydra, and found that if it were cut into parts each part was capable of developing into a new individual. His observations were repeated and extended by Réaumur, Bonnet, Spallanzani, and others. Among annelids, the power is well marked in the earthworms and their allies. Fishes re-

generate their fins; amphibians, with some exceptions, regenerate their tails in the larva (tadpole) and in the adult (urodeles), and also in some cases (salamander, but not frog) their limbs. The most important application of the principle involved in regeneration is in skin grafting and in bone grafting, by which pieces of bone from various parts of the body, as well as portions of joints and whole joints, have been transplanted to remedy defects in other parts.

**Regent**, in countries monarchically governed, a person appointed to carry on the government in the absence, illness, or disability of the sovereign.

**Reggio di Calabria**, seaport town, Southern Italy, cap. of the prov. of Reggio di Calabria. It is the seat of an archbishop and has a fine cathedral. Perfumes, silk, and terracotta are manufactured; fruits, wine, and olives are cultivated; and there are fishing interests. It was partially destroyed by earthquake in 91 B.C., in 1783 and 1894, and on Dec. 28, 1908, it was overwhelmed by an earthquake that devastated much of Sicily and Calabria; p. 129,294.

**Reggio nell' Emilia**, walled city, Central Italy, cap. of the prov. of the same name, stands on the ancient *Via Emilia*. It has numerous churches, including a fifteenth century cathedral and the picturesque Madonna della Ghiara containing some fine frescoes. Reggio is the birthplace of the poet Ariosto and of the astronomer Secchi; p. 89,611.

**Regicides**, the name given to the 150 commissioners chosen by Parliament to try Charles I., of whom seventy acted, and fifty-nine signed the death-warrant.

**Regicides Cave**, a cave situated at New Haven, Conn., near the top of West Rock, used as a place of hiding by the regicides Goffe and Whalley, from whom it took its name.

**Regiment**. A military unit of organization and administration consisting ordinarily of companies and battalions and commanded by a colonel. The number of companies in a battalion and battalions in a regiment, and the number of men in a regiment vary in the different armies. A regiment is a unit of a brigade, in which there are ordinarily two to three regiments. In the United States Army, the regiment is the administrative unit of cavalry, infantry, field artillery, and engineers.

**Regina**, city, Canada, capital of the province of Saskatchewan. It is an important

wholesale distributing center and has manufacturing interests including foundries and machine shops, oil works, flour and lumber mills, brick works, and manufactures of automobiles and carriages; p. 53,034.

**Regiomontanus**, the adopted name of Johann Muller (1436-76), a German astronomer born at Königsberg in Franconia. Together with Bernhard Walther he published *Ephemerides ab Anno 1475-1506*, which was useful to Columbus and Vasco da Gama. He introduced the study of algebra into Germany, and advanced the science of trigonometry.

**Register**, in music, is the compass of the singing voice; but the term is more frequently employed to define particular sections of the voice, as chest, head, lower, upper, or middle register.

**Registration of Births, Deaths, Marriages.** In the United States methods of registration varied greatly among the several States until 1902, when, through the coöperation of the American Public Health Association and the Bureau of the Census, a model form of registration law was adopted, which has since been endorsed by the American Medical Association and which has been enacted and successfully carried out in many States. The essential requirements of this law are that there shall be standard certificates of birth and death; that every death shall be registered, by the undertaker or person who disposes of the body, with the local registrar, who issues a permit for burial or removal, without which no body can be interred or otherwise disposed of. See VITAL STATISTICS.

**Registration of Voters**, the method of proof prescribed for ascertaining the persons who are qualified to cast votes at any election. It is a necessary part of the machinery of elections, and is a reasonable regulation, intended to conduce to their orderly conduct and fairness, and to minimize the possibility of fraud. Lists of persons entitled to vote are made out in advance of an election for use at the polls. Every person who is a qualified elector is entitled to register upon furnishing proof of his qualification and complying with such requirements as may have been provided by statute. England was the first country to use registration. The States of the United States have gradually put the system of registration into operation, for the most part in the later decades of the nineteenth century.

**Regnard, Jean François** (1656-1709),

French dramatist, one of Molière's most brilliant disciples in comedy, was born in Paris. He wrote no plays until more than half-way through his life, and his best comedy, *Le Légataire Universel*, was written only a year before his death. Other plays are *Le joueur* (1696); *Les Ménechmes* (1705).

**Regnault, Alexandre Georges Henri** (1843-71), French painter, was born in Paris. In 1866 he won the Prix de Rome at the Salon by his picture, *Thetis bringing the Arms forged by Vulcan to Achilles*. Reaching Rome he executed there a remarkable portrait of Madame Duparc, and his historical subject of *Automedon breaking the Horses of Achilles*. Among his other pictures are the powerful equestrian portrait of General Prim, now in the Louvre, his *Judith*, *Salome* (Metropolitan Museum of Art), and *The Execution without Judgment under the Moorish Kings of Granada*.

**Regnault, Henri Victor** (1810-78), French chemist, was born at Aix-la-Chapelle. His main researches were not so much in organic chemistry, in which, however, he did good work in establishing the theory of substitution, as in the determination of physico-chemical constants, many of which still remain as the standard.

**Regnier, Mathurin** (1573-1613), French satirical poet, was born at Chartres. His works consist of satires, in imitation of Horace, Juvenal, and Martial, and of elegies and odes, all remarkable for their facility of writing.

**Regrating.** In England an act was passed against regrators, forestallers, and ingrossers in 1552. A regrator was one who bought victuals in a market and sold them again within four miles of the same place.

**Regulators, The.** The name applied to those engaging in a series of insurrections against royal authority (1765-71) in the middle counties of North Carolina. The principal grievances were excessive taxes, dishonest sheriffs, and extortionate court fees. Nine of the Regulators were killed and a large number wounded. Seven were executed and the insurrection was totally crushed.

**Regulus, Marcus Atilius**, was consul first in 267 B.C., when he conquered the Sallentini and took Brundisium; and again in 256 B.C., during the first Carthaginian War, when with the other consul, Manlius Vulso, he invaded Africa, defeating on the way the fleet of Hamilcar and Hanno off Ecnomus in Sicily. His story has inspired Horace with one of his finest passages which is found in the *Odes*

**Regurgitation**, in medicine, the backward movement of blood, food, bile, etc., in the body; thus food may regurgitate from the stomach to the mouth.

**Rehan** (originally, **Crehan**), **Ada** (1860-1916), American actress, born in Limerick, Ireland. She joined Augustin Daly's New York company in 1879 and continued under his management until his death. She achieved especial fame in Shakespearean parts and as Peggy in *The Country Girl*.

**Reich**, Germany, an empire 1871-1919; a federated state, 1919-1933; a Fascist totalitarian state since 1933. The Reichstag is its legislative assembly.

**Reichenbach**, town, Silesia, Prussia. The Prussians defeated the Austrians here in 1762, and the treaty that formed the nucleus of the Grand Alliance against Napoleon I. was signed here in 1813; p. 17,000.

**Reichenbach, Karl, Baron von** (1788-1869), a German physicist. He discovered paraffin and creosote, and maintained the existence of an imponderable agent, which he called Od, and which he supposed to be widely diffused in nature. Among his chief works are *Researches on Magnetism* (1874), and *Odisch-magnetische Briefe* (1852).

**Reid, Sir George** (1841-1913), Scottish portrait painter. The original drawings of his illustrations to *The Tweed from its Source* are in the Edinburgh National Gallery. In later years he devoted himself to portraiture.

**Reid, George Agnew** (1861- ), Canadian artist. At the Chicago World's Fair of 1893 he received a medal for 'The Foreclosure of the Mortgage.'

**Reid, John** (1721-1807), British general, originally named Robertson. He became the owner of several thousand acres of land in Vermont, on which he erected mills and also improved in many other ways, but these were taken by New England settlers in 1774.

**Reid, Mayne**, originally **Thomas Mayne Reid** (1818-83), Irish writer of books of sport and adventure. He produced a great number of books for boys which made him famous, including *The Rifle Rangers* (1850), *The Scalp Hunters* (1851), *The Headless Horseman* (1866), and *The War Trail* (1857).

**Reid, Robert** (1862-1929), American figure and mural painter, born in Stockbridge, Mass. His decorative designs, which are notable for bold drawing and rich color, are to be seen in the Library of Congress in Washington, the Appellate Court House and Paulist Fathers' Church in New York City, and the Massachusetts State House in Boston.

**Reid, Sir Robert Gillespie** (1840-1908), Canadian capitalist, born in Perthshire, Scotland. He went to the U. S. in 1871 to assume control of the building of the International Bridge across the Niagara River. Subsequently he contracted for and undertook the erection of several other important bridges, including the bridge across the Colorado River at Austin, Texas (1880); International Railway Bridge between Texas and Mexico, across the Rio Grande (1882); and the Lachine Bridge, three-quarters of a mile long (1886). He built the greater part of the Canadian Pacific Railway n. of Lake Superior.

**Reid, Samuel Chester** (1783-1861), American privateersman, born in Norwich, Conn. During the War of 1812 he commanded the privateer *General Armstrong* and harassed British commerce. He is said to have suggested the present plan of the American flag by which the stripes remained permanently thirteen instead of increasing with every new state.

**Reid, Thomas** (1710-96), Scottish philosopher. In 1780 he devoted himself to the production of his *Essays on the Intellectual and Active Powers of Man* (1785 and 1788). His earlier *Inquiry into the Human Mind* appeared in 1764. Reid was the foremost exponent of the Scottish philosophy, or the philosophy of common sense.

**Reid, Whitelaw** (1837-1912), American journalist and diplomat, was born in Xenia, O. After two years' experience as a cotton-planter, he joined the editorial staff of the *New York Tribune*, of which he became managing editor in 1869, and editor-in-chief and principal proprietor in 1872. He twice declined the appointment of U. S. minister to Germany, but was minister to France in 1889-92, and Ambassador to Great Britain, 1905-12.

**Reid, Mrs. Whitelaw** (1858-1931), was born in New York City. She was Elizabeth, only daughter of Darius Ogden Mills, California pioneer and financier. She was married to Whitelaw Reid in 1881. A son and daughter were born to them—Ogden Mills Reid, president of the company which publishes the *New York Herald-Tribune*, and Jean, wife of the Hon. Sir John H. Ward, second son of the first Earl of Dudley. Mrs. Reid achieved a world-wide renown for her munificent philanthropy. She founded the American Arts Students' Club in Paris, and for more than a quarter of a century was president of the New York House and School of Industry.

**Reigate**, tn., Surrey, England. The church is in part Norman, and in a vault lie the remains of Charles, Lord Howard of Effingham, of Armada fame; p. 30,830.

**Reign of Terror.** See **France**; **Danton**; **Robespierre**.

**Reimarus, Hermann Samuel** (1694-1768), German naturalist, philologist, and philosopher. His most famous work was *Wolfenbütteler Fragmente eines Unbekannten*.

**Reindeer** (*Rangifer tarandus*), a deer of northern habitat, distinguished conspicuously by the fact that antlers are present in both sexes. The antlers are placed unusually far back on the head, and are very long. In general build the animal is somewhat heavy and clumsy, the limbs being short, and the feet broad and spreading, enabling the animal to travel well in marshy places or soft snow. At the present time the reindeer is confined to the northern parts of both hemispheres. Domesticated reindeer are found in parts of Norway, in Lapland, and in Siberia.

**Reindeer Moss**, finely branched, grayish lichen, which covers large areas in N. Europe and America. It constitutes the principal food of the Reindeer.

**Reinhardt, Max** (1873-1943), stage director, actor and producer, was born in Austria. He is chiefly noted outside of Europe for his spectacular and lavish productions which include such tremendous successes as *The Miracle*, first produced in 1911; *A Midsummer Night's Dream*, produced in large scale outdoor settings since 1933, and staged for the motion pictures by Mr. Reinhardt in 1934; and *The Eternal Road* (1937).

**Reinhart, Charles Stanley** (1844-96), American painter. Some of his paintings are *Coast of Normandy* (1882), *Washed Ashore* (1887), and *Rising Tide* (1888).

**Reisner, George Andrew** (1867-1942), archaeologist. He is professor of Egyptology at Harvard, and curator of the Egyptian Department of Boston Museum of Fine Arts. He has been director of several Egyptian expeditions. Important discoveries during excavations in his charge include, the Pyramids of 68 sovereigns of Ethiopia; the Pyramids of 5 kings of Egypt; the tomb of the mother of Cheops.

**Réjane, Gabrielle Réju** (1857-1920), French actress. She soon became famous, and her creations were *Ma Camarade* (1882), *Clara Soleil*; *Germinie Lucrteux*, *Marpuise*, *Madame Sans Gêne* (1893), and *Les Pas serelles*.

**Relapsing Fever, or Famine Fever**, a

disease common in Ireland during the famine period. The disease is an acute infectious fever, chiefly distinguished by the micro-organism which accompanies it in the blood and by its tendency to run for six days, remit for about the same number, and then to return for about the same number of days, perhaps two or three times, but each time with a tendency to a slighter relapse. Fatal cases are not common.

**Relations.** A general term including all kindred of a person. In law, this term without qualification generally refers to such kindred as would take under the statutes of distribution.

**Relativity.** See **Einstein Theory**.

**Relativity of Knowledge**, in the false and sceptical meaning of the phrase, suggests that human knowledge, because it is in one or other of various ways 'relative,' is necessarily vitiated and devoid of ultimate truth. The relativity of knowledge, in the better sense of the phrase, denotes simply the fact that all knowledge is interconnected, or that all objects of knowledge belong to a single coherent world of reality, so that no one object can be really known except through its relations to other objects. Relativity, in this sense, is not a defect of knowledge, but the very characteristic which makes it possible at all. For it is precisely because the objects of knowledge are mutually involved that knowledge can advance, and by its continual self-correction progress to a more and more adequate apprehension of the reality.

**Relator.** A person who institutes an information in the nature of *quo warranto*, or other proceeding, wholly or partly for the benefit of the public.

**Release.** The surrendering or abandoning of a legal claim or interest in property, or discharge of legal liability by the person in whose favor it exists. In some states a verbal release is sufficient, but generally it should be in writing.

**Relics**, the remains of saintly persons held in veneration and used as means of obtaining benefits.

**Religion**, a general term which has come into customary use since the 16th century. Two things are chiefly required for a satisfactory definition: on the one hand, a statement which will differentiate religion from the allied forms of human thought, such as art or morality; on the other, a statement which is wide enough to include all the forms which religion has taken, both in the form of subjective emotion and in the form of his-

torical reality. Since we do not yet know all the forms which it has taken, every definition must be still only tentative. When man realizes that he forms part of a world order, the resultant feeling seems to be that which is the basis of religion. This leaves room for the feeble thought of the savage, and also includes all the forms which emotion can take, whether it results in moral conduct or in naturalistic fetichism.

What has formed the starting-point in religious development has been variously represented. The question has been further complicated by the fact that it has been sometimes represented as though belief in a primitive monotheistic revelation were of the substance of the faith. Fetichism (Tylor, Comte, Schultze), a belief in ghosts (Herbert Spencer, Caspari, Le Bon), polytheism (Voltaire, David Hume), pantheism (Ulrici, Caird), henotheism (Max-Müller, Von Hartmann, Schelling), monotheism (Creuzer, Professor Rawlinson), have all been regarded as the original basis from which the latter development arose. All theories as to the origin and development of religion are purely hypotheses. Religion can be taken in its simplest form as man's recognition of a world order or a system of things in which he himself has been merged. This was naturism, or a recognition and worship of natural phenomena. But man soon distinguished himself from the system of which he formed a part. He realized not merely his community of origin, but his difference of nature. What so distinguished him was his possession of a soul. Corresponding with this stage of development is animism.

But gradually he became conscious of how the soul, though involved in the body and influenced by it, was capable of controlling it and was not determined by it. Hence arose spiritism, according to which spirit is the controlling factor and end of the world order. The spirits which animate outward things are conceived on the human analogy, as manifesting themselves through these outward things, but also as capable of separating from them. It is here that Herbert Spencer sets his origin of all religion, when he forms his theory about ghosts, and makes the first gods to have been ancestors, the first worship, funeral rites.

Closely allied to animism, and springing from it, is the primitive form of polytheism, which endowed certain natural phenomena on the analogy of men with spirits. It is necessary, however, to distinguish between this

primitive polytheism and a refined polytheism such as appears in Brahmanism, which makes the many gods little more than impersonations of the attributes of the one God. Polytheism has been finally transcended in the great monotheistic religions of Judaism, Islam, and Christianity.

**Remainder**, the remnant of an estate limited to commerce after the termination of a preceding estate or estates granted by the same conveyance. Where a remainder is limited to a person in being capable of taking it whenever and however the preceding estate or estates may be terminated, it is said to be vested. If the person to whom a remainder is limited is unborn at the time, or is uncertain for any reason, or the event upon which it will take effect is uncertain, it is said to be contingent.

**Remak, Robert** (1815-65), German physician, was born in Posen. He studied in Berlin, where in 1859 he became a professor doing valuable work by his microscopical researches in embryology and pathology, as well as by his discoveries in the employment of electricity for medical purposes.

**Remarque, Erich Maria** (1897- ), author, born in Onasbrück, Westphalia, Germany. His book *All Quiet On the Western Front* (1929), was translated into many languages. The film version was banned in Germany. It was followed by a sequel, *The Road Back* (1931). *Flotsam* appeared in 1941.

**Rembrandt, Harmensz van Rhyn** (1606-69), one of the greatest of painters, the glory of the Dutch school, was born in Leyden. A realist and gifted with keen insight into, and intuitive sympathy with, the inner lives of men and women, he was ever an eager student of human nature, and preferred for his subjects—whether of burgher or beggar—faces that bore the marks of life's experience. Thus it was he became pre-eminent the painter of old age. His masterly portrait-groups, such as the *Night Watch* (Amsterdam) and the *Anatomical Lecture*, are in Holland. One of the secrets of Rembrandt's skill, perhaps the fundamental secret, is that his art is an intensification of selected facts, not a distortion of them. And for their intensification he used color and chiaroscuro in a manner to suggest the mystery that lies under the surface of things seen. According to Lord Leighton, he was 'the supreme painter who revealed to the world the poetry of twilight and the magic mystery of gloom.'

The Metropolitan Museum of Art, New York, contains several of his works, and his



*Frame-maker* (1640) is in a private collection in that city. Among other famous works are: *The Syndices of the Drapers*, *Portrait of Himself*, *Portrait of his Mother*, *Descent from the Cross*, *Angel Leaving Tobias*, *The Woman Taken in Adultery*, *Lady with a Fan*, *The Mill*. H. Van Loon's *R. V. R.* (1930) is at once a biography of Rembrandt, a fine historical novel, and a general history of the age.

**Remedy**, in law, the means afforded to obtain redress for injuries, and to protect or enforce rights. The nature of the remedy often determines the proper court in which to commence an action.

**Remensnyder, Junius Benjamin** (1843-1927), American clergyman, was born in Staunton, West Virginia. He was pastor of churches in Philadelphia and Savannah, Ga., from 1865 to 1880, when he settled permanently in New York City, and became pastor of St. James's Lutheran Church there. He prepared a *Lutheran Manual* (1892), generally used by the sect, and published *Doom Eternal* (1880); *The Problem of Life* (1913).

**Reményi, Eduard** (1830-98), Hungarian violinist, born at Heves, Hungary. He made a number of tours around the world. His technical facility was extraordinary, and in his transcriptions of Hungarian airs his playing invariably aroused enthusiasm.

**Remington, Frederic** (1861-1909), American sculptor, illustrator, and author, born at Canton, N. Y. While engaged as a cowboy on a Western ranch he began to model in clay, making admirable statuettes of Indians and cowboys, with their ponies, that attracted favorable notice, particularly his *Broncho Buster* and *The Wounded Bunkie*. Some of his stories illustrated with his own drawings are *Pony Tracks* (1895); *Crooked Trails* (1898); *The Way of an Indian* (1906).

**Remington, Philo** (1816-89), American inventor, born in Litchfield, N. Y., and served an apprenticeship in the fire-arms works owned by his father, Eliphalet Remington, at Ilion, N. Y. In 1870 the firm supplied many rifles for the French Government, but the demand for fire-arms having fallen off, in 1873, James Densmore and George N. Yost induced Remington to undertake the manufacture of typewriting machines. Subsequently the manufacture of both typewriters and rifles came under the control of stock companies, the name Remington being retained.

**Remittent Fever**, a paroxysmal malarial fever, in which the symptoms do not entirely intermit, but only diminish to some extent

at intervals. In India it is often called jungle fever, and is more severe and more fatal than intermittent fever, approaching as it does the type of continued pyrexia, which endangers life by the prolonged high temperature it induces.

**Remscheid**, tn., Prussian Rhine prov. It is the center of the German cutlery trade, and does an enormous export business; p. 79,000.

**Remsen, Ira** (1846-1927), American chemist, was born in New York City. In 1872-76, he was professor of chemistry in Williams College, and in Johns Hopkins University, 1876-1901, when he became its president. In 1879 he founded the American *Chemical Journal*, and was its first editor. He is the author of text-books, which have been translated into many foreign languages.

**Renaissance**, a general term for the revival of ancient classical influences which moved Europe in the 15th and 16th centuries. The Renaissance took its rise in Italy, in the desire to be able to read the masterpieces of Greek literature. If any approximate date can be assigned for the dawn of the new day, it was about the time of the visit of Emanuel Chrysoloras, who, in 1396, had come over from Byzantium—the home of Greek culture—and was lecturing in Florence on Greek literature. The period during which the influence of the Renaissance lasted may for convenience' sake be divided into four parts. The first was contemporaneous with the earlier life of Cosimo de' Medici, before he attained power (1389-1433), during which Byzantine scholars were the chief humanists; the second period lasted until Cosimo's death (1464); the third synchronized with the opening and ending of the public life of Lorenzo de' Medici (1470-92); while the fourth lasted throughout the winter of the Medicean fortunes at Florence and the pontificate of Giovanni de' Medici (Leo x.), until the sack of Rome (1527), during the pontificate of another Medicean pope (Clement vii.). Among the famous men of the Italian Renaissance are Dante, Petrarch, Boccaccio, Raphael, Michael Angelo, Andrea del Sarto.

In Germany it took deep root, where it assisted in helping on the reformation. Among the most distinguished of its humanists were Erasmus, Reuchlin, Ulrich von Hutten, with such artists as Holbein, Dürer, and others. In Holland the new influence expressed itself rather in art than letters. The Van Eycks, Lucas van Leyden, revealed to their age the mysteries of oil painting, and paved the way

for Rubens and Van Dyck. In Spain and Portugal the force of the Renaissance spent itself in exploration, colonization, and religious reform. In England, on the other hand, the movement confined itself almost wholly to literature and scholarship. Englishmen went to Italy to study under the great humanists of the day, and brought back with them the seeds of that efflorescence which rendered the era of Elizabeth the Golden Age of English literature. Grocyn, Linacre, More, Colet, Ascham, Cheke, Camden, and others diffused culture throughout England. Shakespeare, Marlowe, Bacon, Ben Jonson, and Milton were all in turn inspired by the Renaissance spirit. So also in France, in literature and art, the stimulative force of the Renaissance was strongly felt, Clément Marot, Villon, Ronsard, and the Pléiade, Mellin de Saint Gellais in poetry, Comines, Montaigne, and Rabelais in prose, the Scaligers, Budæus, Calvin, Dolet, Salmasius, and Beza in scholarship, Fouquet, Perréal, the three Clouets, and Jean Cousin in painting, and Columbe and Goujon in sculpture being the leading exponents.

Perhaps in architecture more than in any other department the influence of the Renaissance was experienced in greatest measure. 'Renaissance architecture' proper is really the return to ancient Greek and Roman styles adapted to modern needs and requirements. The 'Venetian-Renaissance' style is the one most frequently seen nowadays. In it each story is distinguished by a separate line of columns or pilasters, with their entablatures, the windows exhibiting the rounded arch with columns, while figures usually fill in the spandrels. Extreme variety of detail and wealth of carving are also prominent features in this style.

**Renal Calculus**, or **Kidney Stone**, is formed from the deposited solid constituents of the urine, which vary from fine sand to masses two or three ounces or more in weight. Stones may be of uric acid, calcium oxalate, calcium phosphate, and other rarer substances, though often they are of mixed composition. A highly acid urine favors such. They may be present in one or both kidneys at the same time.

**Renan, Ernest** (1823-92), French writer. He was born at Tréguier, on the seaboard of Brittany. In 1860 he traveled in Syria, and gathered the local information he needed for his *Vie de Jésus*. He was dominated by his artistic genius. The beauty and clearness of the French language have seldom been better

displayed than in his crystal sentences. This may partly account for his popularity, but the best sale of his works is no doubt mainly due to the fact that he dealt with sacred subjects with a peculiarly audacious originality, and in a manner within the comprehension of the least instructed. His principal works are *History of the Origins of Christianity*, which includes the *Life of Jesus* (1863), *The Apostles* (1866), *St. Paul* (1867), and *Marcus Aurelius* (1880); to which appeared later, as a complement, *History of Israel*.

**Renault, Louis** (1843-1918), French jurist, was born in Autun. He was a member of The Hague Tribunal and in 1907 received one half the Nobel peace prize. He published *Introduction à l'étude du droit international* (1879).

**René the Good** (1409-80), Duke of Anjou and Count of Provence. By the will of Queen Joanna he became heir to the throne of Naples in 1435, but was driven from the city by Alfonso of Aragon in 1442 and retired to Provence where he devoted himself to art and poetry.

**Renfrewshire**, county, Scotland. Dairy-farming is the chief industry. Agriculture and stock-raising are carried on and coal, iron, and shale are mined. The manufacture of thread, cotton, and chemicals, shipbuilding, engineering, and sugar-refining, are the other chief industries. Gourock is a popular watering place; p. 288,575.

**Rennell, James** (1742-1830), English geographer, was born in Devonshire. He was the founder of the branch of geography known as oceanography. His publications, which are valuable and the result of careful research, include a *Bengal Atlas* (1779), a map of *India* (1783), a geography of *Herodotus* (1800).

**Rennes**, town, and archiepiscopal see, France. It trades in dairy produce, and has manufactures of sail-cloth, table linen, leather, and agricultural implements. Here Boulanger (1837-91), was born, and here in 1899 Dreyfus was tried for the second time; p. 83,418.

**Rennet**, a preparation made from the lining membrane of the true stomach of the calf, which yields an enzyme, or soluble ferment, capable of causing the coagulation of casein. Rennet preparations are much used in cheese-making to produce the curd, which is subsequently separated from the whey, or watery portion.

**Rennie, John** (1761-1821), Scottish civil engineer, was born in Phantassie, Haddingtonshire. Settling in London (1791) he did

the engineering work of the Kennet and Avon Canal, the Rochdale Canal, and the Lancaster Canal; built Waterloo Bridge, and the bridges at Musselburg, Kelso, and Southwark; and London Bridge, though not completed till after his death, was designed by him. He constructed or improved London docks, East and West India docks. He also designed and constructed the breakwater at Plymouth.

**Rennie, Sir John** (1794-1874), English civil engineer, son of John Rennie, was born in London. He early entered his father's business, and was knighted on completion of London Bridge from his father's designs (1831).

**Reno**, city, Nevada. It is a manufacturing, commercial, and residential city and is the seat of Nevada State University. In 1927, the legislature of Nevada made it possible to establish residence in the state in three months, thereby increasing the number of divorces to 2,103 the next year. In 1931 the new six-weeks' law is said to have caused the number of divorces to double; p. 21,317.

**Renoir, Auguste** (1841-1919), French artist, one of the most important of the Impressionistic school, was born in Limoges. Renoir's art is characteristically impressionistic. He excels in figure work, particularly the nude, being wonderfully successful in his flesh tints. Among his best known works are *The Ball at Montmartre*, *the Beautiful Bather*, *Wounded Girl*, *Young Girls at the Piano* and portraits of Monet and Madame Charpentier and her children.

**Renouvier, Charles Bernard** (1818-1903), French philosopher, was born in Montpellier. After the revolution of 1848 he published *Manuel républicain de l'homme et du citoyen* (1848), which was charged with advocating extreme socialistic ideas, and as Carnot approved his ideas he made him Minister of Public Instruction.

**Rensselaer**, city, New York. It is a manufacturing and railroad center. The chief industrial establishments are felt, wool shoddy, and knitting mills. The village of Bath was annexed to it in 1902; p. 10,768.

**Rensselaer Polytechnic Institute**, a school of engineering and science, was established by Stephen Van Rensselaer in Troy, New York, in 1824. It is the oldest school of engineering, now in existence, to be established in any English-speaking country. In 1930 a building for the school of architecture, costing \$400,000, and an extension to an-

other building, costing \$100,000, were constructed.

**Rent**, in ordinary language, refers to the payment made for the occupation of land, or of houses or other buildings erected upon it. In political economy, rent is the difference between the price obtained for the produce of a given area of land and the total cost of production. The theory of rent is associated with the name of Ricardo, who expounded it in his *Principles of Political Economy and Taxation* (1817, 1819, and 1821), though he had been partly anticipated by Malthus and others.

**Rent**, from a legal point of view, the consideration paid by a tenant to his landlord for the use and occupation of real property. The term is also frequently applied to designate the compensation for the use of personal property belonging to another.

**Renwick, James** (1662-88), Scottish Covenanter, was born near Moniaive, Glencairn. Exposed to the tyranny of the Privy Council, he had to lead the life of a fugitive, but succeeded in 1684 in publishing the *Apologetical Declaration*. He is celebrated in church history as 'the Angel of the Covenant.'

**Renwick, James** (1790-1863), American physicist, was born in Liverpool, England. In 1838 he was one of the commissioners to delineate the boundary line between Maine and New Brunswick. He translated *Allemand's Treatise on Artillery*, and edited several English scientific text-books for American students.

**Renwick, James** (1818-95), American architect, was born in New York City. His greatest work was St. Patrick's Cathedral in New York City. Other buildings of note designed by him are Grace and Calvary churches, New York City, and the Smithsonian Institution and Corcoran Gallery in Washington. His art collection he bequeathed to the New York Metropolitan Museum.

**Reorganized Church of Jesus Christ of Latter-day Saints**. See **Mormon Church**.

**Repairs**, a term which as used by lawyers generally signifies the labor and expense necessary for keeping buildings in proper condition. In the absence of special stipulation the tenant in a lease will be held responsible for executing all repairs during its currency, and must as a rule leave the property in the same order as that in which he got it, except in so far as it has deteriorated by natural decay.

**Reparations**, a legal term denoting compensation for injuries done or restoration of

goods unlawfully taken. It has been used specifically since the World War to designate the payments levied by the Allies upon the defeated Central Powers in the peace treaties. The legal basis for the imposition of reparations upon Germany was provided in Article 231 of the Versailles Treaty, which read as follows: 'The Allied and Associated Governments affirm and Germany accepts the responsibility of Germany and her allies for causing all the loss and damage to which the Allied and Associated Governments and their nationals have been subjected as a consequence of the war imposed upon them by the aggression of Germany and her allies.'

With the rejection of the Versailles Treaty by the United States, the Reparations Commission was composed of representatives of France, Great Britain, Italy, and Belgium, with Japan and Yugoslavia replacing Belgium in certain cases. This committee finally fixed the amount of reparations due and the arrangements for payment by Germany. A conference of the Allied premiers at Paris in January, 1923, resulted in a deadlock between the British and French. On the basis of two decisions of the Reparations Commission that Germany had defaulted in her timber and coal deliveries, France and Belgium occupied the Ruhr Valley, the industrial center of Germany (Jan. 11, 1923).

They hoped to exploit the rich coal mines and other industries of the Ruhr so as to secure greater reparation payments than had been forthcoming from the German Government. Although they took over the railways and the local government and introduced French and Belgian technicians and engineers to run the mines and other properties, the occupation was not a financial success. The troops met with the passive resistance of a large part of the German population, who were supported in their refusal to work for the invaders by relief funds supplied by the German Government. The French and Belgians placed the entire region under martial law, evicted 31,000 Germans, imprisoned thousands of others, and executed 10. The effect was to bring the entire German industrial system to the verge of collapse.

The other powers, led by Great Britain, exerted strong pressure upon Poincaré to end the Ruhr occupation. British trade had been seriously injured by the stoppage of German industrial activity and Italy and Belgium showed dissatisfaction. These considerations finally induced Poincaré to accept the Ger-

man offer of an impartial examination of Germany's capacity to pay.

In 1924, an advisory committee convened, which included Charles G. Dawes and Owen D. Young, unofficially representing the U. S. The report of the Dawes Commission, submitted April 9, 1924, provided a basis for the temporary settlement of the reparation problem. Germany made full reparation payments as provided by the Dawes plan for five years, from Sept. 1, 1924, to Sept. 1, 1929, when the Young plan, ratified in 1930 by the governments, went provisionally into effect.

The Dawes plan did not fix the total reparation payments to be made by Germany. It did fix a definite schedule of annual payments, to be continued for an indefinite period. It also provided elaborate machinery and a detailed method of raising the payments, of transferring them out of Germany, and of settling disputes or defaults that might arise. The Dawes payments were based upon the estimated capacity of Germany to pay, rather than on the total of Allied claims.

The Dawes plan was admittedly a stop-gap affair. It was obvious that sooner or later the Allied governments would be obliged to reach a definitive agreement with Germany as to the total payments to be made. Accordingly, representatives of Germany, France, Great Britain, Belgium, Italy and Japan met at Geneva Sept. 16, 1928, and established a new committee of experts to work out a 'complete and definite settlement' of the reparations problem.

With Owen D. Young as chairman, the committee met at Paris from Feb. 11 to June 7, 1929, on the latter date submitting a unanimous report to the Reparations Commission and the governments concerned. The number of annuities payable by Germany was fixed at 59, commencing at 1,707,900,000 gold marks and progressing gradually to a maximum of 2,428,800,000 marks in 1965-66. The average annual payment for the first 37 years was set at 2,050,600,000 marks. An international bank (the Bank of International Settlements) was to be established to receive and distribute the reparation annuities. The Young report was adopted in principle, with certain modifications, by official representatives of the 12 interested nations who met at The Hague, Aug. 6-31, 1929.

A second conference to deal with the German reparations problem and related financial issues was held at The Hague Jan. 3-20, 1930. There 14 agreements were signed by

representatives of 21 governments, *viz.*, Austria, Belgium, Bulgaria, Czechoslovakia, France, Germany, Great Britain, Australia, Canada, India, New Zealand, Poland, Portugal, and Rumania. These agreements provided for the definite settlement of Germany's reparation liabilities and for the constitution of the Bank for International Settlements as proposed in the Young plan. Following its ratification by the governments of Germany, France, Belgium, Great Britain, and Italy and the enactment of requisite laws by Germany, the Young plan officially went into effect, May 17, 1930. The Bank for International Settlements had previously been established at Basle, Switzerland. After the official inauguration of the Young plan, France commenced the evacuation of the Third Zone of the Rhineland.

Despite the optimism with which it was received, the Young plan lasted only to the end of the first of the 59 years of its prescribed life. It was wrecked by a combination of the world depression, which already in 1930 had seriously affected German economy, and the continuance of the Franco-German political struggle. Mr. Hoover had been apprised of the seriousness of the situation by reports from American diplomatic and consular officers in Germany and other parts of Central Europe. The President's concern was aroused primarily because of the large American financial interests at stake in the German crisis. Of the \$2,272,000,000 long-term foreign debt incurred by Germany during 1924-31, 55.2 per cent. was held in the United States. Convinced of the necessity of immediate action, President Hoover on June 20, 1931, after consultation with the leading members of Congress in Washington, issued from the White House his proposal for a general moratorium. The statement follows:

'The American Government proposes the postponement during one year of all payments on intergovernmental debts, reparations and relief debts, both principal and interest, of course, not including obligations of governments held by private parties. Subject to confirmation by Congress, the American Government will postpone all payments upon the debts of foreign governments to the American Government payable during the fiscal year beginning July 1, next, conditional on a like postponement for one year of all payments on intergovernmental debts owing the important creditor powers.'

The response to the President's call for a moratorium was almost unanimously favor-

able. Newspapers of all kinds of political opinions, as well as financial, industrial and political leaders with very few exceptions, supported his action. The governments of other nations most vitally affected also expressed their agreement, with the single exception of France. The French reply, received on June 24, however, without declining the President's proposal, contained reservations and terms intended to safeguard the Young plan. The following accord was finally approved and initialed in Paris on July 6, 1931:

'After an exchange of views the French Government states that it is in agreement with the United States on the essential principle of President Hoover's proposal, and on the following propositions, which may be expressed thus:

'1. The payment of intergovernmental debts is postponed from July 1, 1931, to June 30, 1932. 2. However, the Reich will pay the amount of unconditional annuity. The French Government agrees, in so far as it is concerned, that the payments thus made by the Reich shall be placed by the Bank for International Settlements in guaranteed bonds of the German railroads. 3. All suspended payments shall be subject to interest in accordance with the conditions suggested by the American Government, payable in ten annual instalments beginning with July 1, 1933. 4. The same condition shall apply to the bonds to be issued by the German railroads.' Other details were left to a committee to be formed by the governments concerned.

In October, 1931, Premier Laval of France visited Washington and conferred with President Hoover upon various Franco-American problems, notably that of intergovernmental debts. In 1932 the Lausanne Conference had agreed upon terms for the final settlement of the Allied reparation claims on Germany. By the Gentleman's Agreement, the Allied powers pledged themselves not to ratify the reparation accord until 'a satisfactory settlement' of their war debts to the United States had been reached. Meanwhile the Hoover Moratorium was to continue on German and non-German reparation and on the war indebtedness of the various European governments to each other. During 1933, no 'satisfactory settlement' of the debts owed to the United States government was reached. In 1933 Finland was the only country owing war debts to the United States which paid in full. Finland has ever since made each payment falling due, and Hungary has made some "token" payments. See WAR DEBTS.

**Repeal**, the abrogation or annulment of a statute by another legislative act. On December 5, 1933, the 18th (Prohibition) amendment to the Constitution of the United States was repealed, when Utah became the 36th state to ratify the 21st (Repeal) Amendment. Thus ended one of the great social experiments of the world, the United States being the eighth nation to abandon such an experiment.

**Repentance**, the feeling of grief experienced by man when he is conscious that he has acted wrongly in word or deed.

**Repertory Theatre**, a type of theatre, common in continental European cities, where plays of all kinds are produced, not primarily for profit, as in the case of the ordinary theatre, but for cultural purposes and the encouragement of new dramatic writers. Notable examples are the Comédie-Française in Paris, the Burgtheatre in Vienna, the National Theatre in Oslo, Norway, and the Berlin Schauspielhaus, Germany. The Civic Repertory Theatre organized by Eva Le Gallienne and others in New York City has enjoyed great success. The Theatre Guild, also in New York City, which has built a beautiful theatre for its productions, may in a broad sense be considered a repertory theatre, although strictly speaking it cannot be so classed since its productions have continuous runs of varying lengths and only one play is produced at a time. It also leases other theatres for its use.

**Repin, Ilya Yefimovitch (Elias)** (1844-1918), Russian portrait and genre painter, was born near Kharkov. He studied in St. Petersburg, and in 1870 was awarded a traveling scholarship for his *Raising of Jairus' Daughter*. Before entering on his foreign study he painted and exhibited his *Burlaki* ('Bargemen on the Towpath'), considered the first masterpiece of modern Russian art. His portraits are remarkable for characteristic insight and powerful handling, especially one showing Tolstoi striding behind his plough. Other important pictures are *Ivan the Cruel* (1885), *St. Nicholas Staying an Execution* (1889).

**Replevin**, a common law action for the recovery of personal property, the first step of which is for an officer to take possession of the property and deliver it to the plaintiff upon receiving from him a bond of indemnity.

**Reports, Law.** Printed collections of complete or abridged transcripts of records of cases determined in courts of law. At present

in England and in all the States of the United States official court reporters, or officials performing the same duties, are appointed or designated, and official reports of at least the important cases of the highest courts of record and of some of the inferior courts are issued in each State.

**Repoussé**, a term used by artists in metal to describe designs that are first hammered up from the inner side of the object to be decorated (vases, shields, cups), and then finished by chasing with a graver. In the 16th century Cellini was the great master of this art, especially in its application to the precious metals. This art was revived in France about the middle of the 19th century.

**Replier, Agnes** (1858- ), American essayist and critic, of French extraction, was educated at the Sacred Heart Convent, Torresdale, Pa. Her essays are distinguished by dignity of treatment, a lucid style, and a delicate sense of humor. Her publications include *Books of Men* (1888); *Points of View* (1891); *The Fireside Sphinx*, a charming and sympathetic study of cats (1901); *Compromises* (1904); *Mere Marie, of the Ursulines* (1931); *To Think of Tea* (1932).

**Representation**, in politics, is the term applied to the system under which power is exercised by an individual or body in virtue of popular election. An early stage in the history of representation is to be found in the national assemblies of estates, of parliaments in the 12th and 13th centuries. The royal exchequers were in a continual condition of bankruptcy. It became necessary to devise a new system of taxation, and to that end the different communities were bidden to send representatives to a central assembly. It was soon discovered that a petition presented in Parliament, especially a petition presented by Parliament, was infinitely more likely to succeed than a petition presented to the king in the old private way. In the 15th century we find statutes regulating the franchise and the qualification of members, and providing for the frequent assembling of parliaments. The 16th century was a century of reaction against parliamentary institutions all over Europe. In England, Parliament practically became an instrument in the hands of the monarch. The 17th century witnessed a great revival of the power of Parliament, which began with the opposition to James I., and culminated in the revolution of 1688. This latter event ultimately transferred the supreme control, not only in legislation but also in administration, both of

domestic and foreign affairs, from the crown to the Parliament. The governments of the United States, Canada, Australia, and British South Africa have almost from the very first adopted thoroughly representative schemes of government.

**UNITED STATES.**—Representation in some form was recognized in the governments of the English colonies in America, the first colony to obtain a representative legislature being Virginia, the General Assembly of which commenced to meet in 1619. The others obtained in course of time similar privileges. Yet in all but a very few cases the executive was entirely independent of the people, and responsible to the crown or proprietary alone. This was one of the main causes of the friction that prevailed during the 18th century. At present, in each State of the United States districts are marked out by the legislature for the election of State senators and representatives respectively.

The members of the U. S. House of Representatives are apportioned among the different States after the completion of each census according to population. They are either chosen by the State electors at large, or, as is generally the case, districts are marked out by the State legislature. Each State is entitled to two representatives in the U. S. Senate, who hold office for six years, and who until 1913 were chosen by the votes of the members of the State legislature. In that year the Seventeenth Amendment was added to the Constitution, making provision for the direct election of Senators.

The President is appointed by a body of independent electors, each State contributing a number equivalent to that of the Senators and Representatives whom it sends to Congress. As these electors are chosen by the people, however, the President is in all but name elected directly by the popular vote.

**PROPORTIONAL REPRESENTATION** is an electoral system devised for the rectification of a manifest injustice in the ordinary methods of political election. In countries where these methods prevail a substantial minority of voters may obtain only a small minority of members, and may have practically little or no representation. A number of plans have been suggested for remedying this evil.

See **ELECTIONS; ELECTORATE; LOCAL GOVERNMENT; PARTY GOVERNMENT.** Consult Commons' *Proportional Representation*; Curtis' *Proportional Representation*; King and Raffety's *Our Electoral System*.

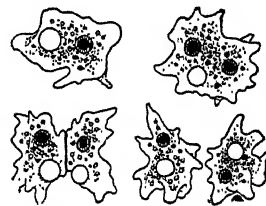
**Representatives, U. S. House of, the**

Lower House of Congress. See **UNITED STATES, Government.**

**Reprieve** is an act of the executive or of a criminal court by which the carrying out of a capital sentence is temporarily delayed. When granted by the executive the object generally is to allow time in order that the advisability of a pardon may be considered.

**Reprisal.** Formerly when an individual suffered injury from a foreign state, he was given a letter of reprisal, in virtue of which he could seize or confiscate the property belonging to that state or its subjects by way of securing compensation. The idea of reprisals is that they should be a means of redress short of war, and they are only to be used when compensation cannot be got by amicable methods. The following acts of reprisal without the declaration or existence of war are recognized by the sanction of usage and authority: (1) the sequestration of property belonging to the offending state; (2) the sequestration of the property of its citizens; (3) the partial or complete suspension of commercial and other intercourse between the two nations; (4) suspension or annulment of treaties in part or in whole; (5) withdrawal of all privileges and rights to domiciled citizens of the offending state; (6) a pacific blockade.

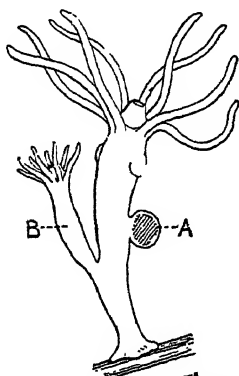
**Reproduction** is the term applied to the whole process whereby life is continued from generation to generation. Reproduction is one of the prime functions of protoplasm, and is intimately related to growth, of which



*Reproduction by Fission: Four Stages in the Reproduction of Amœbæ.*

it may indeed be regarded as a special case. The phenomenon occurs in its simplest form in many Protozoa, as in amoeba, for example, which grows until it reaches the limit of advantageous size, and then reproduces by dividing into two parts (fission). Comparing multicellular forms with the Protozoa, we find that, generally speaking, these, in place of simply dividing, give off two kinds of spe-

cially modified cells, known respectively as *ova* and *spermatozoa*, which after sexual union has occurred become capable of developing into new organisms. This is the ordinary process of sexual reproduction, as known alike in the higher plants and the higher animals. Another type of reproduction consists in the liberation of clusters of the ordinary body cells, which are capable of



Reproduction by Budding.

A, Ovary, with ovum; B, fully formed bud, with mouth and tentacles.

growing into a new organism. In plants, vegetative reproduction is very frequent—the tubers of the potato, the subsidiary bulbs produced by most bulbous plants, the runners of the strawberry, and so forth.

Sexual reproduction by the union of male and female cells is practically universal in multicellular plants and animals. In some cases, however, female cells are produced which without sexual union are capable of development. Such ova are described as *parthenogenetic* (See PARTHENOGENESIS), and occur, for example, in some insects. All methods of reproduction are costly to the individual; wherefore reproduction does not normally occur until growth has almost ceased—that is, until the individual has reached its maximum development. It is also a commonplace of biology that the rate of reproduction is highest in unspecialized organisms, and tends to diminish with progressive specialization. The reason for the progressive diminution in higher forms in the number of offspring produced is not far to seek. It is better for the species that relatively few should be produced, with increased chance of surviving to maturity, than an enormous

number where the chances of an individual surviving are small, because the agents of elimination which act in the earlier stages are largely non-selective in their mode of action. If it is possible to protect the young through their early stages, as is done by the parents in more specialized forms, then, by leaving the more fit to breed, the standard of the species is always being raised; hence the biological justification of the parental care shown by birds and mammals. See BIOLOGY; EMBRYOLOGY; HEREDITY; CELL.

**Reptiles** (*Reptilia*), a very large class of vertebrate animals, including Tortoises and Turtles, Lizards of many kinds, the divergent New Zealand 'lizard' *Sphenodon*, Snakes, and Crocodilians—five distinct orders with living representatives, but including also many orders of wholly extinct types, such as Ichthyosaurs, Plesiosaurs, and Dinosaurs.

Reptiles occupy a central position in the Vertebrate series: beneath them are Amphibians and Fishes, above them are Birds and Mammals. They begin the series of higher Vertebrates. Reptiles are cold blooded, the temperature of the body not greatly exceeding that of the surrounding medium; the heart is three-chambered, except in Crocodilians, where four chambers first occur; the body is covered with scales, with which subjacent bony plates or scutes are sometimes associated; the great majority are oviparous, while in some the eggs are hatched within the mother. A general classification of living reptiles is as follows: (1) *Rhynchocephalia*, including only *Sphenodon*; (2) *Lacertilia*, or lizards; (3) *Ophidia*, or snakes; (4) *Chelonina*, or tortoises and turtles; (5) *Crocodylia*, or crocodiles and alligators. See TORTOISES AND TURTLES; LIZARDS; SNAKES; CROCODILES; ALLIGATOR.

**Republic**, a form of government in which the sovereign power is vested, not in a hereditary ruler or in a ruler elected for life, but in the body of citizens, or in a more or less privileged section of them. According to the constitution of the governing body, republics have varied from the most exclusive oligarchy to a pure democracy. The several republics of Greece and that of Rome were, at the outset at least, aristocratic communities. The mediæval republics of Venice, Genoa, and the other Italian towns were also more or less aristocratic. The most important of modern republics is that of the United States of America, where pure democracy has been tried on a scale unknown elsewhere. Except during the short-lived empire of 1863-7,



Mexico has been a republic since 1824. Since the revolution in Brazil in 1890, all the South American states (omitting the three Guiana dependencies) are republics. Since the World War, the following European countries have become and continue to be republics: Russia, Estonia, Finland, Latvia, Lithuania, Turkey, Spain.

**Republican Party**, in American history, the name applied to three political parties.

(1) The official name, in the early period under the Constitution, of the party opposed to Federalist policies, which later became known as the Democratic Party. (See DEMOCRATIC PARTY.)

(2) The party founded by the followers of John Quincy Adams, during the latter part of his administration (1825-9), which was ultimately absorbed in the New Whig Party (1834-6). (See NATIONAL REPUBLICAN PARTY.)

(3) By far the most powerful and the best known of the Republican Parties is the one organized in 1854-6, after the dissolution of the Whig Party, to oppose the extension of slavery, and to assert national supremacy as against the States' Rights tendencies of the Democratic Party. In 1854, at Ripon, Wis., before the Kansas-Nebraska Bill was signed by the President, a group of Whigs, Democrats, and Free Soilers threatened to form a new party if the bill should pass; and on July 6 the name Republican was adopted by a convention at Jackson, Mich. Other State conventions followed, and the new party spread rapidly, especially in the West.

In 1854 the new party carried 15 out of 31 States. On June 17, 1856, the first Republican National Convention was held in Philadelphia, at which John C. Frémont was nominated for the Presidency. Although Frémont was defeated in the ensuing election, the party succeeded in electing most of its candidates for Congress in the Northern States.

In 1857 the Republican Party opposed the Dred Scott Decision of the Supreme Court, claiming that this was the result of a corrupt bargain, and thus alienated the South. In 1860 the Republicans held their National Convention at Chicago, and adopted a platform which, among other things, declared that 'the normal condition of all the Territories of the United States is that of freedom, which Congress is bound to demand and defend.' On the third ballot Abraham Lincoln was nominated for President. In the ensuing election, Lincoln received 180 out of 303 electoral votes. Immediately before and

after the inauguration of Lincoln occurred the secession of the Southern States, which formed the Confederate States of America, and thus provoked the Civil War. The withdrawal from Congress of the Democratic members from the seceding States left the Republican Party in control of the government, and of the conduct of the war. In the National Convention of 1864 slavery was made the keynote of the platform, and its complete extirpation was decreed. The assassination of Lincoln (April 14, 1865) brought to the Presidency Andrew Johnson of Tennessee. In 1868 and 1872 Gen. U. S. Grant was elected President by the Republicans, while the supremacy of the party remained unchallenged in Congress until 1874. The Republican platform in 1876 advocated civil service reform and a resumption of specie payment. In the following election the Republican candidate, Rutherford B. Hayes, received a majority of only one electoral vote over Samuel J. Tilden, the Democratic candidate. During the administration of President Hayes the character of the party gradually changed; new leaders arose, and the emphasis of party policy shifted from the coercion of the South to such economic problems as the tariff, the currency, and commercial relations. The National Convention of 1880 advocated civil service reform, a protective tariff, government aid to education, and 'the protection of the honest voter in the South.' A bitter struggle between the old and new leaders resulted in a victory for the latter, who placed James A. Garfield in nomination. Upon the death of Garfield, in 1881, Chester A. Arthur, the Vice-President, succeeded to the Presidency. The Republican platform of 1884 called for a high protective tariff, international bimetallism, the regulation of interstate commerce, and the upbuilding of the navy. A large section of the party, popularly called 'Mugwumps' refused to support James G. Blaine for President, and Grover Cleveland, a Democrat, was elected—the first defeat for a Republican Presidential candidate since Lincoln's time. In 1888 the tariff was the principal issue, the Republican Party being uncompromisingly in favor of a high protective system. The party was returned to power by the election of Benjamin Harrison. In the election of 1892 the Republican candidate, Harrison, was decisively defeated by Cleveland.

In its platform of 1896 the Republican Party upheld the gold standard; William McKinley was chosen President to succeed

Cleveland. The assassination of McKinley in July, 1901, and the succession of Vice-President Theodore Roosevelt, involved no notable change of policy. The campaign of 1904 was based on the party's past achievements and the general national prosperity.

By 1908, however, the demand for tariff reform became so insistent that the chief plank in the Republican platform for that year declared 'unequivocally for a revision of the tariff immediately following the inauguration of the next President.' William H. Taft, the Republican candidate, was elected President by a large majority. Early in 1911 a large and active part of the Republican electorate prevailed on former President Roosevelt to enter the campaign for the Republican nomination. His candidacy widened the breach in the Republican ranks; and after a bitter struggle for supremacy in the National Convention, which resulted in the victory of the Taft following, the Roosevelt forces withdrew from the Convention and organized the Progressive Party. In the national election of 1912 the Republicans were overwhelmed. W. H. Taft ran third to Woodrow Wilson, the Democratic nominee, and to Roosevelt, the Progressive candidate.

In 1916, chiefly on the issue of Wilson's peace platform, the Republicans again met defeat in the Presidency, though winning the House. During 1917 party lines were wiped out in support of the war program; but in 1918 the elections resulted in control of both Houses by the Republicans. This was followed by a Republican victory with the election in 1920 of Warren G. Harding, of Ohio, as President, and Calvin Coolidge, of Mass., as Vice-President. The death of Harding in Aug. 1923 brought Coolidge to the Presidency, to which he was elected in his own right in 1924, with Charles G. Dawes, of Illinois, as Vice-President. Herbert Hoover, Secretary of Commerce in the Coolidge administration, was elected President in 1928 to succeed President Coolidge, who 'did not choose to run,' with Charles Curtis, of Kansas, as Vice-President. The economic depression, which began to attain considerable proportions in 1929 and 1930, was the strongest contributing factor in the defeat of Hoover for re-election in 1932, with an overwhelming victory by his Democratic opponent, Franklin D. Roosevelt. The Republican Presidential candidate, Alfred M. Landon, was decisively defeated by Roosevelt in 1936. In 1940 Roosevelt was again reelected over

Republican Wendell Willkie. See UNITED STATES, *History*.

**Republican River**, rises in the eastern part of Colorado, and flows in a northeasterly direction to the border of the State, crossing the n.w. corner of Cheyenne co., Kansas. It then enters Nebraska, and flowing e. near the border re-enters Kansas. It joins the Kansas River at Junction City, after a course of about 525 miles.

**Repudiation**. When a state repudiates its financial obligations, or makes default in paying the interest or capital of loans made to it, it is a question of international law whether and to what extent another state will interfere for the protection of its subjects who suffer loss. In this particular case, although the right of interference exists, governments generally refuse to take any steps in favor of the sufferers, partly because of the responsibility which a state would assume, partly because loans to states are usually made with sufficient knowledge of the attendant risks, and partly because of the difficulty which a defaulting state may really have in meeting its obligations at the time. A modern instance of repudiation is that which was announced by the Soviet government of Russia immediately on its accession to power, when it disclaimed all connection with or responsibility for the foreign debts of the former Imperial State which it replaced.

Repudiation, in American history, means State legislative action reducing or wiping out the State debt. This has usually occurred in the newer States or in States of new industrial importance in the second third of the 19th century, when there was throughout the country a craze for internal improvements, especially railroads, built with governmental aid, and for banks assisted by the State.

After the Civil War repudiation was common, because heavy interest had accrued, because the war had greatly impoverished the Southern States, and because State debts were recklessly, extravagantly, and corruptly increased, in many cases, during the period of negro domination. It has been estimated that by repudiation, Southern States reduced their debts from \$235,000,000 to \$108,000,000.

The Federal Constitution, as interpreted by the U. S. Supreme Court, furnishes no redress to a creditor of a State. A few State constitutions have provided, or have empowered the Legislature to provide, how suits may be brought against the State.

**Requiem**, the mass for the repose of the

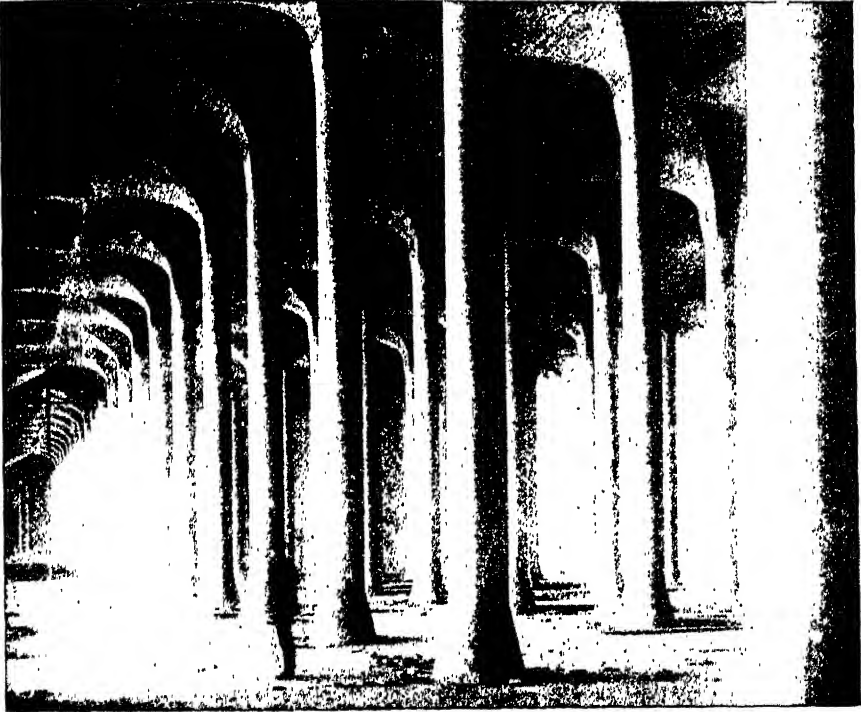
dead in use in the Roman Catholic Church. The term is also applied to musical settings for the mass of the dead, as those of Mozart, Cherubini, Berlioz, and Verdi.

**Requisitions, Military,** the demands made by the authorities of an invading army upon the people of the occupied territory for provisions, forage, labor, and transportation. It is the rule of most civilized nations that such supplies shall be paid for at the conclusion of the conflict.

pression (save the Brenner) in the Alpine chain.

**Rescripts,** in Roman law, were answers returned by the emperor when consulted on questions of law, either by the parties in some controversy, or, more commonly, by officers charged with the administration of justice.

**Rescue,** the offense of freeing another by force from lawful custody. By the common law it is an offense punishable as a felony,



*Baldwin Reservoir, Cleveland, Ohio.*

**Reredos,** in church architecture the wall or screen at the back of the altar. Its use dates from the 11th century, prior to which the episcopal seats and choir stalls were in line with the altar wall. In course of time the reredos came to be richly adorned with carvings, paintings, or tapestries. The materials employed are wood, stone, and alabaster.

**Reschen Scheideck,** Alpine pass (4,902 feet), in the Tyrol, leading from Landeck (above Innsbruck) in the Inn valley to Meran in the Adige valley. It has been known since pre-Roman days, and is the lowest de-

a treason, or a misdemeanor, according to the character of the criminal rescued. In the United States it is generally a felony, and is not classed as the same degree of crime as that of which the rescued prisoner was guilty. If the prisoner was guilty only of a misdemeanor, rescue is generally only a misdemeanor.

**Reservations, Indian.** The policy of setting aside definite portions of land in the United States for the use of the various Indian tribes was inaugurated in 1786, being made necessary by the increase of white population and the consequent desirability of

confining the aboriginal population to narrower limits. At first the reservations were formed chiefly as a result of the cession of land to the government, the Indian tribe retaining a specified part of such land for its own use, such cessions being governed by treaty. In 1871 this practice was terminated, and transactions with the Indians were brought under the immediate control of Congress. The Indian Reservations are administered by the Bureau of Indian Affairs. They are subject to the jurisdiction of the United States, but as far as possible the regulation of their own domestic affairs is left to the Indians. The U. S. Government endeavors to protect them from unscrupulous whites and from their own ignorance as well; educational work is stressed; and a constant endeavor is made to make of the Indian wards good and useful citizens. There are Indian reservations in Arizona, California, Colorado, Florida, Idaho, Iowa, Kansas, Nevada, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wisconsin and Wyoming.

**Reserves**, in military usage, forces and materials held for future use. In actual battle, the reserves are troops not in action but kept back and held ready to act at a critical moment in order to insure victory or turn aside defeat. Reserve supplies of materials, such as ammunition, provisions, and other necessities, are always established near the scene of action to be available without delay when needed. The term reserves is also applied to those men who have received some military training and can be called upon in time of national emergency, but who ordinarily follow the pursuits of civil life. Their organization varies in different countries. The United States Army Reserve Corps numbers 113,177 officers and 2,998 enlisted men; the Naval Reserve 12,578 officers and 40,012 men; the Marine Corps Reserve 14,945 officers, most of whom were called up in 1940-41.

**Reservoirs** are receptacles for the storage of supplies held in reserve. The term is generally limited to structures for storing fluids, particularly water, but, broadly speaking, it includes any container of stored materials or energy. The object of the reservoir may be to equalize supplies which vary in production or consumption, or to maintain a uniform level, head, or pressure. Kitchen, or cooking stoves, or ranges, for use in houses without running water or plumbing fixtures were often provided with reservoirs (water backs) for maintaining a supply of hot water. Generally

speaking, however, a reservoir is a relatively large structure, built wholly or partly in the earth, for the storage of water for domestic and industrial uses, fire protection, irrigation, water power, navigation, or flood protection.

*Water Reservoirs in General.*—These fall into three main classes: (1) *receiving or impounding*, which are generally located at the source of supply, and are designed to make good the deficiencies in yield in times of drought; (2) *distributing or supply*, located near the point or area of water consumption, to meet interruptions in the supply due to breaks in the conduits, or to meet fluctuations in the consumption or use of water from hour to hour or day to day; (3) *equalizing*, to maintain a uniform flow of water, or to give a constant level or head, either for pumps to work against or to afford a fairly uniform pressure, as in a water-works distributing system. Either distributing or equalizing reservoirs may afford considerable storage against the falling off in the yield of the source of supply. Impounding reservoirs are located on perennial or on intermittent streams, and are filled by gravity. Other reservoirs may be located wherever conditions are favorable, and may be filled either by the natural flow of streams, by gravity conduits, or by pumping through force mains.

There are many important reservoirs with a capacity of 50 billion gallons and more in the United States, as, for example, those which form a part of the water supply system of New York City (see CATSKILL AQUEDUCT). See DAMS, AQUEDUCTS, IRRIGATION. Large reservoirs include the one formed by the Assuan, across the River Nile, which supplies water for irrigation in Egypt and the Gatun reservoir, connected with the Panama Canal, which is reported as having a capacity of 1,370 billion gallons.

**Reservoirs, Use in Flood Prevention.** The floods in New England and Pennsylvania in 1936 served to focus attention on the necessity for prevention. Among the methods used were the dredging of river beds and the erection of dams and reservoirs to hold the surplus water. Work then done was insufficient to prevent, although it did check, the disastrous floods in the Mississippi Valley in 1937. With the completion of the system of reservoirs in the near future it is hoped that the danger from floods will be entirely eliminated.

Most of the dams in the system are for the purpose of irrigation and power as well as flood control. The Tygart Dam in West

Virginia is intended, however, purely for flood control. It has a capacity of 106,600 million gallons.

By far the largest project is the Boulder Dam, completed in 1936 at a cost of \$70,600,000. It has a capacity of 10,000,000 million gallons and a height of 727 feet. It is intended to supply irrigation and power as well as flood control to the states in the southwest. Lake Mead, the reservoir formed by Boulder Dam, is the largest artificial lake in the world.

Other large projects for flood control are the Fort Peck Dam on the Missouri River and the Grand Coulee on the Columbia River. The cost of the latter is \$113,675,000.

**Resht**, town, Persia, capital of the province of Gilan. Enzeli, its port, is 14 m. n.w. on the Caspian Sea. Resht is the center of the silk industry and exports large quantities of that product and also of rice, cotton, fruits, and tobacco; p. about 35,000.

**Resiczabánya**, town, Roumania. It is the center of a mining district, and has iron works and railway shops; p. 12,578.

**Residence**. See **Domicile**.

**Residuary Legatee**, the person to whom a testator gives the residue of his property—that is to say, all that remains after debts and specified legacies have been paid.

**Resina**, town, Italy, in the province of Naples, on the western slope of Vesuvius. It is on the site of ancient Herculaneum. Since 1903 the ascent of Mount Vesuvius can be made from here by means of an electric railway,  $4\frac{1}{2}$  miles in length; p. 20,352.

**Resins**, compounds of carbon, hydrogen, and oxygen that occur as natural or induced (through incisions) exudations from plants. True resins are amorphous solids with a vitreous fracture, soften on heating, burn with sooty flame, are soluble in alcohol, ether, chloroform, carbon disulphide, fixed oils, and volatile oils. Examples are Common Rosin (Colophony), Benzoin. Oleo-resins and balsams are mixtures of resins and volatile oils; among the former class are the turpentine, gummy exudations of various species of the pine family, as American, Russian, Strassburg and French turpentine. The balsams are liquid or soft products, as Canada Balsam. Gum resins are milky exudations from plants containing gum, wholly or partly soluble in water, resin soluble in alcohol, and some volatile oil. Among these are Asafetida, Ammoniac, Myrrh, Gamboge, and Scammony, all of which are used in medicine.

**Res Judicata** (*Lat.* 'matter has been decided'), a term denoting a prevailing rule of

law to the effect that after a cause of action has once been finally determined upon its merits by the courts, either in a court of last resort, or in an inferior court without appeal, it cannot be again litigated by any of the parties thereto in any other court.

**Resolution**, in music, a term applied to the process of change from a dissonant chord to one which is consonant.

**Resonance**. See **Sound**.

**Resorcin**, meta-dihydroxy-benzene,  $C_6H_4(OH)_2$ , is obtained by the fusion of different gum resins with caustic potash, but is best prepared by melting benzene metadisulphonic acid with caustic soda. Resorcin is used as an antiseptic in the treatment of skin diseases and as a hair wash, and its amido-derivative as a photographic developer.

**Resources, Natural, Conservation of**. See **Conservation Movement**.

**Respiration**. See **Lungs**.

**Respirator**, an instrument worn over the mouth and nose to prevent dust or cold from penetrating to the lungs. Respirators are also employed in entering mines filled with gas, and are useful to workmen dealing with flying dust or iron filings.

**Respite**, in the civil law, a composition with creditors upon obtaining additional time for payment. In criminal law the term denotes a reprieve or temporary postponement of the execution of sentence.

**Respondent**, a party in an equity action corresponding to a defendant in a suit at law; the party who answers a bill in equity.

**Respondentia**, a term employed in maritime law to denote a contract under which money is loaned on goods constituting the whole or a portion of the cargo of a ship, upon condition that if the goods are lost through any of the perils set forth in the contract, the borrower shall be discharged from payment. See **BOTTOMRY**.

**Restaurant**, a public eating place. Restaurants, probably originated in France, and Paris still remains the city in which the restaurant, as a separate institution, rather than as an annex to a hotel, is to be seen at its greatest excellence. In London, restaurants were established gradually during the latter half of the 19th century, and by 1900 every hotel of the first order had attached to it a restaurant open to the public. New York is well supplied with restaurants of all kinds, from the high-priced establishments of Fifth and Park Avenues to the 'automats,' where wholesome food can be obtained for a nickel and its multiples. All of the large hotels have

restaurants. The cafeteria, of Western origin, has gained great popularity in the last decade, and is to be found throughout the United States.

**Rest-harrow** (*Ononis arvensis*), a perennial leguminous plant of Europe, most frequently found on sandy ground near the sea.

**Restigouche**, river (200 m. long) between New Brunswick and Quebec, Canada, forming for some 50 miles the boundary between these provinces. The name, Restigouche, meaning 'the river that divides like the hand,' was given with reference to its five main branches.

**Restoration**, the process of renovating a building so that it shall wholly or in part regain its original character. Such work was first undertaken in the 19th century when an interest in ancient buildings, particularly the old cathedrals and monastic buildings, began to take a strong hold on the discriminating public. Among the most important examples of restoration are many of the English and French cathedrals.

**Restoration**, a term applied, in English history, to the accession of Charles II. (1660) and, in French history, to the accession of Louis XVIII., first in 1814, and secondly on June 28, 1815.

**Restorationists**, generally, those who hold the doctrine that all men, even the unbelieving and unrepentant, after and by means of due punishment, shall be restored to the divine favor and saved. The term is applied specifically to a small body in the United States known as Universal Restorationists, who as followers of Rev. Hosea Ballou, a Universalist clergyman of Boston, maintained an organization for a short time (1830-41) in Mendon, Mass.

**Restoration of Pictures.** See **Picture-Restoring**.

**Restraint of Marriage.** The marriage relation is favored and protected by law, and provisions in a contract, will, or deed having for their object the restraint of marriage are invalid. However, the law does not prohibit a person from providing for another *while* he or she continues in an unmarried state.

**Restraint of Trade.** A covenant in restraint of trade is one made by an employee on joining a business, or a trader on selling a business, not to carry on the same trade within a certain area or for a certain term. See **MONOPOLIES**; **TRUSTS**.

**Resurrection**, the rising again of the body from the grave, and its reunion with the soul. Anticipations of the belief are found among

the Zoroastrians and the Egyptians; the Greek conception of the immortality of the soul, however, as developed in Plato's *Phædo*, was independent of the notion of bodily revival. It is not till comparatively late in the development of the Hebrew religion that the doctrine of resurrection appears. The words of Jesus do not necessarily imply a belief in a bodily or universal resurrection, but the apostles, regarding His resurrection as the crowning proof, proclaimed it as universal.

**Resurrectionists**, or **Resurrection-men**, otherwise **Body-lifters** or **Body-snatchers**, terms popularly applied in England to a class of men who (c. 1760-c. 1835) used to disinter newly buried corpses and sell them to the medical schools for dissection.

**Resuscitation.** In apparent death both the circulation and the respiration are at a low ebb, and may even be suspended. When failure of the respiratory function is the cause of apparent death, the patient is said to be asphyxiated. Should the circulatory apparatus be primarily at fault, syncope results. The most important causes of asphyxia are drowning and inhalation of noxious fumes or gases. There are several manual methods of restoring respiration, and insufflation and electrical stimulation are also used. The pulmotor is widely used in cases of drowning and asphyxia and a recently developed 'artificial lung' can prolong respiration when the respiratory system has been paralyzed.

**Reszke, Jean de** (1853-1925), Polish operatic singer, was born at Warsaw. He made his debut as a baritone at Venice in 1874, but a few years later became one of the greatest dramatic tenors. He and his brother EDOUARD, a bass singer, were favorite members of the Metropolitan Opera House Company in New York for many years.

**Retainer.** A fee paid to an attorney and counsellor at law to engage his professional services in a particular action or in all legal matters in which the client may be involved during a certain period. The term is also applied to a written authorization given by a client to an attorney to represent him in one or more legal matters.

**Retaining Walls** are walls built for the purpose of confining water or earth, and form important parts in the construction of reservoirs, docks, fortifications, railways, and roads. The ways in which a retaining wall may fail are by revolving about the front of any horizontal joint; by sliding on the plane of any horizontal joint; or by the bulging of the body of the masonry. The first is the

much more frequent, while the second is least frequent.

**Rethberg, Elizabeth** (1898- ), Operatic soprano born in Germany, debut made in Dresden, 1915. In 1922 she first appeared in N. Y. By invitation of Benito Mussolini she sang the leading role in Respighi's *The Sunken Bell* at Rome in 1929. At the request of the composer she sang the title role in Strauss's *The Egyptian Helen* at its world premiere in 1928. After overwhelming ovations in 1930-31 at La Scala, Milan and the Royal Opera, Budapest and later in N. Y., the New York Guild of Vocal Teachers presented her with a gold medal inscribed "The Most Perfect Singer in the World."

**Retirement.** The transfer of an officer of the army or navy from the status of active service to the retired list, which operates to remove him from command and promotion. In the U. S. Army and Navy, all officers are compulsorily retired at the age of sixty-four in the army, and sixty-two in the navy.

**Retort,** a vessel to contain a substance from which volatile products are to be extracted by heating. Iron retorts are employed with amalgams; while glass, porcelain, or metal retorts are used for laboratory processes. See DISTILLATION; GAS MANUFACTURE.

**Retreat,** in military strategy, to retire before the enemy, is one of the most important manœuvres of warfare (see REAR GUARD; STRATEGY AND TACTICS). The retreat is also a military signal to mark the close of day, sounded by bugle or trumpet, after which the band plays the national air, the sunset gun is fired, and the flag is hauled down.

**Retreat,** a period of retirement for spiritual contemplation and the exercise of devotion, practised both in the Roman Catholic and the Anglican Church.

**Retrenchment,** in military fortification. See FORTIFICATION; REDOUBT.

**Retriever.** As the name implies, the retriever is a breed of dog trained to find out and bring back any killed or wounded game. One variety, known as wavy coated, was probably the result of a cross with the setter; the other, known as curly coated, is from the water spaniel or poodle.

**Retroactive Laws, or Retrospective Laws,** the statutes or laws that have an effect upon proceedings or facts that are past.

**Retrograde,** as applied to the motions of bodies in the solar system, signifies a direction contrary to the order of the signs. See CONJUNCTION.

**Retz, Jean François Paul de Gondî**

(1614-79), French cardinal. In the civil war of the Fronde he opposed Condé and Mazarin, and was created a cardinal in 1651. His *Mémoires* obtained high praise from Voltaire and Hallam.

**Réunion** (formerly **Bourbon**), French island in the Mascarene group, Indian Ocean, 420 m. e. of Madagascar. It has an area of 965 sq. m., and is divided by a chain of volcanic mountains and a plateau into two distinct east and west parts. Sugar, rum, coffee, vanilla, perfumes, geranium essence, aloë fibre, tapioca, starch, dried manioc are exported. The chief port is Pointe-des Galets, on the northwest coast; p. 186,637.

**Reuter, Fritz** (1810-74), German humorist. In 1859, he issued the first part of *Olle Kamellen* (*Old-Time Stories*), a series of prose tales, including his best work, *Ut de Franzosentid* (1859; Eng. trans.); *Ut Mine Festungstid* (*My Prison Life*, 1862); *Ut Mine Stromtid* (1862-4; Eng. trans. as *An Old Story of My Farming Days*); *Dörchläuchting* (*His Highness*, 1865). The life of his countrymen he was able to reproduce almost perfectly, and his characters are so true that they seem almost alive, especially the incomparable Uncle Bräsig in *Ut Mine Stromtid* and Governor Weber in *Ut de Franzosentid*.

**Reuter, Paul Julius, Baron von** (1821-99), founder of Reuter's News Agency, born at Cassel, Germany. His first news gathering operations were in Germany and France. He removed his headquarters to London in 1851, after which the business expanded rapidly. special telegraphic cables were laid and the agency's sphere of operations extended all over the world.

**Reuterdahl, Henry** (1871-1925), artist and writer on naval subjects, born at Malmö, Sweden, settled in the United States. His article *Needs of the Navy* published in 1908 caused government investigation of naval conditions. He was on the cruise of the United States fleet around South America 1907. During the World war he became an officer in the United States Naval Reserve. His paintings hang in the Naval Academy at Annapolis and the National Museum at Washington. He also painted a naval scene in the Missouri State Capitol at Carson City.

**Reveille,** the signal given by bugle or drum about break of day to give notice to soldiers and sailors that it is time to get up. See BUGLE CALLS.

**Revel,** now **Tallinn** or **Tallinn-Reval**, fortified seaport town of Estonia, 249 m. by rail s.w. of St. Petersburg, on the south coast

of the Gulf of Finland. The upper town or Domberg still possesses a mediæval aspect with its thirteenth-century Danish Castle, long the governor's residence and the Cathedral, founded in the thirteenth century. Revel was founded in 1219-28 as a Danish town, and from 1238 it was a Hanseatic trade centre. In 1346 it was sold by Denmark to the Teutonic Knights; in 1651 it became Swedish; in 1710 it was captured by Peter the Great, and definitely became Russian in 1721. When Estonia became a republic in 1920, the harbor of Tallinn was greatly improved. During the World War the town was attacked by Germans; p. 130,000.

**Revelation** is a familiar theological expression, commonly applied to the knowledge of Himself which God has given to man in Holy Scripture. In itself, however, the word is properly used not merely of the divine knowledge communicated to us in Scripture, but of all divine knowledge communicated through whatever source.

**Revelation, Book of, or The Apocalypse**, purports to have been written by John, presumably the Apostle, and is a record of the visions seen by him in Patmos. It belongs to the order of prophetic writings known as apocalyptic. The book has been the subject of many vigorous controversies, not yet closed, principally in regard to its authorship, its integrity, and its interpretation.

**Revels, Master of the**, a former English state official whose chief function was that of censor and licenser of plays and kindred representations. See CENSORSHIP OF THE DRAMA.

**Revenue, Public.** The revenues of the modern state may be classified according to the government by which they are raised. In the United States, public revenues fall into three classes—National, State, and local—and this is true, in general, of all federal states. In centralized states like France, only two forms, national and local, are of significance. On the basis of their economic character, the public revenues may be classified as gratuitous, contractual, and compulsory. Of the compulsory revenues, taxes are by far the most important. In the United States, the Federal tax revenue consists of customs revenue, excise taxes, and taxes on incomes and inheritances. The State and local revenues of the United States are based upon the general property tax. In some States, income, inheritance and business taxes are also employed.

In the most recent Revenue Acts, additions

were made to rates of taxation and exemptions were greatly lessened, thus broadening the tax base so that those in the lower brackets should bear a share of the tax burden while the rates in the higher brackets were enormously increased. The principle of progression was applied; in other words, the rate increased as the amount of income increased. Exemptions were made in order that the tax might not encroach upon the income necessary for support.

While it is comparatively simple to determine the tax to be paid when income is, for example, received from one source, the handling of income tax returns for large corporations and wealthy individuals has become a difficult matter involving careful training and a detailed knowledge not only of the provisions of the Act but various administrative rulings interpreting the Act. 'Gross income' includes gains, profits, and income derived from salaries, wages, or compensation for personal service, also from interest, rent, dividends or the transaction of any business carried on for gain or profit. Certain items such as life insurance paid by reason of the death of the insured, annuities and so forth need not be included in gross income. The Federal Revenue Act of 1938 effected considerable changes in income taxes as applied to capital gains and losses. The normal tax on individuals is 4% with a surtax of from 4% to 75%, applied to incomes exceeding \$4,000, after allowing certain credits and exemptions. The law provides for personal exemptions, as to both normal and surtaxes, of \$1,000 for a single person, \$2,500 for a married person and \$400 for each dependent. There is also an earned income credit which applies at rate of 10% against normal tax on earned incomes up to \$14,000. A minimum credit of \$3,000 earned income is allowed in all cases. The 1939 Act contains noted changes from the previous Act in the income tax of corporations, especially with relation to tax on undistributed profits. A corporation having income not exceeding \$25,000 is subject to a rate ranging progressively from 12½% to 16%. A corporation having income exceeding \$25,000 is subject to a rate of 19% and the tax is reduced by 2½% of all dividends paid from taxable income. The Act also continues the capital stock tax and provides whereby corporations may redeclare capital stock value every 3 years. This Act requires a great deal of study if the details are to be thoroughly understood. Also complicated are rules about



the Gift and Estate Taxes. See FINANCE. PUBLIC; and for the principal sources of public revenue TARIFF; TAXATION; EXCISE TAXES; United States; reports of the United States Treasury; Social Security; publications of the United States Chamber of Commerce.

**Revere, Paul** (1735-1818). American patriot, was born in Boston, Mass. He was one of the party that destroyed the tea in Boston Harbor, and he was at the head of a volunteer committee consisting of thirty young mechanics, who formed a secret society to watch the British. When it was known that the latter intended to move, Revere crossed over to Charlestown, and on April 18, 1775, the night before Lexington and Concord, at a signal rode on to Lexington and to Lincoln, rousing the minute men as he went; at Lincoln he was stopped, but a companion succeeded in reaching Concord. During the war he rose to lieutenant-colonel of artillery; afterward he returned to his goldsmith's work; and in 1801 founded the Revere Copper Company at Canton, Mass.

**Reverend** (Latin *reverendus*, to be respected), a title given generally to the clergy of all denominations. In the Anglican Church deans are 'Very Reverend,' bishops 'Right Reverend,' and archbishops 'Most Reverend.'

**Reversing Layer**, a stratum of incandescent vapors enveloping the sun, by the absorptive action of which the Fraunhofer lines are produced.

**Reversion**, in law, denotes the residuary interest held by one who has granted a limited estate in certain property to another. A reversion is a proper legal estate which may be alienated by deed or will and descends to heirs. (See ESTATES.)

**Reversion**, in heredity, a manifestation in which the characteristics of remote ancestors are more prominent than those of the immediate progenitors. See HEREDITY.

**Revetment** is a sheathing, facing, or retaining wall, as of masonry or other materials, for protecting a mass or bank of earth, etc., as in fortifications and river banks.

**Review**, as a military term, signifies a formal or official inspection of troops or war vessels.

**Revised Statutes.** See STATUTES.

**Revival of Learning.** See RENAISSANCE.

**Revival of Religion, or Religious Revival**, a name given to an emergence of spir-

itual fervor and activity in a community or district, speedily becoming epidemic, and reclaiming the indifferent and the immoral to divine grace and consecration. Such outbreaks of religious zeal as took place during the Middle Ages in connection with Montanism and the Crusades are fitly enough called revivals; while the Protestant Reformation of the sixteenth century, the greatest revival since the apostolic age, gave rise to the counter-revival of the Jesuits in the Roman Catholic Church. The term 'revival,' however, was not commonly employed until after the widespread movement in the first half of the eighteenth century from which the Methodist churches originated. The revival which took place in New England and extended throughout the Atlantic Coast States, from about 1734 to 1750, under Jonathan Edwards, Bellamy, and the Tennents, was generally designated the Great Awakening. In America there was a revival beginning in 1796 and culminating in 1800 in the Scotch-Irish revival of Kentucky. The great American revival of 1857-61 began in New England, particularly in Connecticut and Massachusetts, and became so widespread as to attain a national character. Another remarkable revival in 1874-77 originated in the labors of two American evangelists, Moody and Sankey. The Salvation Army carries on its work largely by methods known as revivalistic. Contemporary revivals in America have been organized under the leadership of such evangelists as J. Wilbur Chapman, 'Gypsy Smith,' and the late William A. Sunday. The Oxford Group Movement under the leadership of Frank Buchman has spread with great rapidity during the last decade not only in the United States and England but in many other countries.

**Revolution**, a fundamental change in government, or in the political constitution of a country, effected suddenly and violently, and mainly brought about by internal causes.

**Revolution, American**, or the American War of Independence, the struggle (1775-1783) by which the thirteen English colonies in America separated from Great Britain and became the United States of America. The fundamental causes of the Revolution were of two kinds, political and economic. There were three great differences: (1) a differing theory and practice of representation; (2) different ideas of the rights of the individual, or a disagreement as to the extent of governmental power over individuals; (3) conflict-

ing ideas as to the extent and character of a local self-government. To these opposing political beliefs was added a long nurtured resentment on the part of the colonies against England's economic policy with her subjects across the seas. Accepting the mercantile theory of colonial regulation—the dominant theory in Europe of that age—England had adopted a restrictive system which found expression in three kinds of laws: (1) Acts of Navigation, which protected English shipping agents against foreign competitors; (2) Acts of Trade, to secure monopoly for English merchants of the colonial commerce; (3) Acts giving to English manufacturers a monopoly of the colonial markets. As these laws were administered, they do not seem to have been actually disadvantageous to the colonies, but they necessarily established a real opposition of interest between America and England.

The ministry proposed to rid the colonial governors of dictation by the colonial assemblies, to enforce the trade laws, and to establish an effective defensive system for the colonies, supporting this system by taxes raised in America. The Stamp Act of 1765, enacted for this purpose, aroused the colonies to wrath. Colonial delegates assembled in a Stamp Act Congress, which asserted the right of Americans to tax themselves, and the episode ended with the repeal of the obnoxious act in 1766. The series of measures known as the Townshend Acts, passed by Parliament in 1767, and similar in their purpose to the Stamp Act, also aroused a storm of indignation in America, which resulted in the repeal of all their provisions but the tax on tea. Following these errors of statesmanship came the Boston Massacre of 1770, the Boston Tea Party of 1773, the Boston Port Bill of 1774, and the attempted punishment of Boston by British soldiers under General Gage—resulting in the flame of rebellion which, after the Battles of Concord and Lexington (April 19, 1775), spread along the whole Atlantic seaboard. At last, on July 2, 1776, after fierce debate in the Continental Congress, a resolution of independence was agreed upon; and on July 4 the Declaration of Independence, substantially as draughted by Thomas Jefferson, was adopted.

The American fundamental idea was that the power is the people's, and that the magistrates invested with legislative, executive, and judicial functions are trustees and servants, and accountable always. The state did

not, as the great English charters presumed, give or yield rights to the individual, but by his own nature he had them. In America, therefore, 'bills of rights' summed up the rights which the sovereign people withheld from their agents, the government. With the desire for independence came a proposition for articles of confederation. For eighteen months Congress labored with that difficult problem; and even after it had devised and adopted such articles (November, 1777), nearly four years passed before all the States could be gotten to adhere to what at best was a league of friendship. On June 15 the second Continental Congress appointed, as commander-in-chief of the American forces, George Washington. Before his arrival in Massachusetts occurred (June 17) the Battle of Bunker Hill, in which the British after terrible losses, dislodged the Americans from their fortifications on Charlestown peninsula, immediately north of Boston. By Washington's sudden occupation (March 4, 1776) and fortification of Dorchester Heights (on a peninsula south of Boston), General Howe was outmaneuvered, and on March 17 he evacuated the city.

Washington hurried part of his army to New York, since that was the most likely point of the British attack. The city of New York was the key to the Hudson valley, which, if the British could control it, would separate rebellious New England from the less radical middle colonies, and enable Howe to crush the head of the rebellion. New York was very hard to defend with Washington's meagre resources, and when Howe came, as expected, he easily drove the American army from Long Island (August, 1776), and later from the city, compelling Washington to retreat up the Hudson and then across New Jersey. For the next year (1777) the British plan of campaign again centered about the Hudson valley. Gen. Burgoyne was to come down from Canada by way of Lake Champlain, and was to be met by Howe coming up the Hudson, while St. Leger was to leave from another point in Canada, come down the Mohawk valley, and join the other two. Burgoyne fought desperate engagements which failed, and at last, baffled and beset, and with no word from Howe, he surrendered (Oct., 1777) at Saratoga. The effect of Burgoyne's surrender, together with the influence of Benjamin Franklin, the American representative at Paris, was to decide the king of France to enter into an open alliance

with the American states. Washington spent the winter of 1777-8 at Valley Forge in the vicinity of Philadelphia, where his men suffered terrible hardships. In the spring Sir Henry Clinton, who had succeeded Howe, evacuated Philadelphia. Late in 1778 the British turned their attention to the South. Savannah was captured, but Charleston could not be taken until the spring of 1780.

The opportunity had come for Washington, who was in the North, to deal a decisive blow to the British. Strengthened by a French army under Rochambeau, he swooped down from New York, and penned the British army up at Yorktown. Now came the great service that had been hoped of the French alliance. The French fleet held off a rescuing British fleet until Cornwallis, despairing of aid, sur-

**Revolution, Sons of the**, a patriotic society founded in New York in 1876 and incorporated in 1884 to keep alive the memory of the patriotism of those who served the country during the war for independence and to preserve records of the period. Male descendants of soldiers, sailors, marines, officers and civil officials, who served between April 19, 1775, and April 19, 1783. The society has 31 state societies, with a total membership of 7,650. The general society meets triennially.

**Revolution, Sons of the American.** A national patriotic society established in New York in 1889. Its purposes are identical with those of the Sons of the Revolution. It has about 18,000 members.

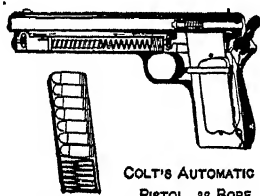
**Revolvers.** A pistol is a small rifle with a



COLT REVOLVER.  
SINGLE ACTION.



SMITH & WESSON SAFETY  
HAMMERLESS REVOLVER.



COLT'S AUTOMATIC  
PISTOL .38 BORE.



THE LUGER  
AUTOMATIC PISTOL.

*Common Types of Revolvers and Pistols.*

rendered (Oct. 19, 1781). The loss of Cornwallis's army, together with the terrible drain on England's resources because of her struggles with other enemies in various parts of the world, led to proposals for peace, which ended in the signing of a treaty at Paris (Sept. 3, 1783) in which England acknowledged American independence.

**Revolution, Daughters of the.** An organization founded in 1891, in New York, to perpetuate the patriotic spirit of the Revolution, to publish and preserve Revolutionary records and to encourage the study of American history.

**Revolution, Daughters of the American.** A national society organized in Washington in 1890. It has 690 chapters, and chapter regents have been appointed for Canada, England, the Philippines and South Africa. The membership is over 160,000.

short barrel, which may be aimed and fired with one hand. A revolver is a pistol having a revolving cylinder or revolving barrels. The revolving chamber appeared at about the same time as the revolving barrels. Numberless patterns of this device have appeared, probably the first being that patented by the Marquis of Worcester in 1661. An improved method of causing the revolution was patented in England and the United States by E. H. Collier, an American, in 1818. After many years of experiments, Samuel Colt, of Hartford, Conn., patented his world-renowned Colt's Revolver, which is still in use, and probably has no superior in the world. Many improvements have been introduced, from time to time, principally in the direction of greater rapidity of fire.

**Revue des Deux Mondes**, the greatest of French reviews, was founded in 1829 by Ség-

ur-Dupeyron. Published twice a month, this review has, in the highest sense of the word, been cosmopolitan in scope.

**Reward.** A recompense offered or paid by a governmental authority or private individual for the performance by one or more persons of some particular act.

**Reybaud, Marie Roch Louis** (1799-1879), French author, was born at Marseilles. In 1850 he was elected a member of the Academy. His best work is a satire, *Jérôme Paturot à la Recherche d'une Position Sociale* (1843), followed by *Jérôme Paturot à la Recherche de la Meilleure des Républiques* (1848).

**Reyer, Ernest** (1823-1909), French operatic composer, born at Marseilles. His best-known operas are *Le Selam* (1850) and *Salammbo* (1890). Reyser has also published *Notes de Musique* (1875).

**Reykjavik, or Reikjavik**, tn., cap. of Iceland, at s.w. corner; contains cathedral, governor's house, observatory, parliament house (with valuable historical library), college, hospital, free library, and banks; p. 26,428.

**Reynard the Fox**, the English name of a famous mediæval apologue or 'beast-fable,' of which the earliest known variant (which may indeed be the original poem) is the Latin *Reinardus et Isengrimus*, believed to have been written in the 10th century. From Goethe back to the mediæval minnesinger, Heinrich der Glîchesære, this epic has been in great favor among the Germans.

**Reymont, Ladislas Stanislas** (1867-1925), Polish author, wrote *The Peasants*, for which he was awarded the Nobel Prize (1924); *Vampire*; *The Revolt*.

**Reynolds, John Fulton** (1820-63), American soldier, born at Lancaster, Pa. In November, 1862, he was given command of the First Corps. He participated, as a major-general, in the battle of Fredericksburg, and was with the reserve at Chancellorsville. On July 1, 1863, he was in command of the Union troops then present on the field of Gettysburg, and was struck by a bullet that caused almost instant death.

**Reynolds, Sir Joshua** (1723-92), English portrait painter, first president of the Royal Academy (founded 1768), knighted in 1769, and appointed painter-in-ordinary to George III. in 1784. Born at Plympton, Devonshire, he was pupil of Hudson, the chief portrait painter of the day. He settled in London, where his portraits of the Misses Gunning

and of Admiral Keppel secured his position as the leading portrait painter of the day. In 1784 he painted one of his finest portraits, *Mrs. Siddons as the Tragic Muse*; but in 1789 he had to lay down his brushes owing to failure of eyesight.

**RFC**, Reconstruction Finance Corporation. A U. S. New Deal agency.

**Rhadamanthus**, in ancient Greek mythology, a son of Zeus and Europa, and a brother of Minos, king of Crete. He lived so just a life that after his death he was made a judge of the dead.

**Rhætia, or Rætia**, a province of the Roman empire, lay s. of the Danube.

**Rhaetian Alps**, a chain of the Alps in Grison canton, Switzerland. The main group is **Bernina**, in which the highest peak is Piz Bernina, 13,295 ft. high.

**Rhamnaceæ**, a natural order of trees and shrubs, of which representative genera are *Rhamnus* and *Zizyphus*. *Z. spina Christi* is one of the prickly shrubs said to have furnished the material for Christ's crown of thorns.

**Rhamnus**, a genus of shrubs and trees belonging to the order Rhamnaceæ. They bear cymes or racemes of flowers, followed by berry-like drupes. Some of the species are cultivated.

**Rhampsinitus**, the classical name of the Egyptian monarch Rameses III., who reigned during the first half of the 12th century B.C.

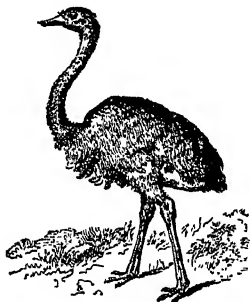
**Rhapsodists**, in ancient Greece, professional reciters of epic poems, who bore a laurel branch in addition to their splendid dress.

**Rhatany, or Rattany**, a name given to various plants of the genus *Krameria*, native to Peru and Bolivia, the roots of which are used in pharmacy.

**Rhazes, Mohammed Abukekr Ibn-Zacheria** (c. 860-932), Arabian physician, was born in Persia. He is reputed to have written two hundred and twenty-six medical treatises, among which were ten books dedicated to his patron Almanzor, comprising a general study of medicine. He gave the earliest account extant of smallpox and wrote the first treatise concerning the diseases of children.

**Rhea, or American Ostrich**, a genus of running birds, confined to the unforested parts of South America. They are smaller than the African ostrich and have three toes, instead of two. The smallest of the rheas, known as Darwin's Rhea, a Patagonian spe-

cies, is only about 36 inches long. It was formerly abundant but has been captured so extensively for its fluffy wing feathers that it is in danger of being exterminated.



*Rhea, or American Ostrich.*

**Rhea**, in ancient Greek mythology, the daughter of Uranus and Gæa, and the wife of Cronus, her brother, by whom she was the mother of Hestia, Demeter, Hera, Hades, Poseidon, and Zeus. The worship of Rhea appears to have originated in Crete, where she seems to have been one of the various forms of the earth-goddess.

**Rhea Sylvia**, in ancient Roman legend, the daughter of Numitor, a descendant of Æneas, and by Mars the mother of Romulus and Remus.

**Rheims**, town, department of Marne, France, which suffered serious havoc during the Great War (1914-19). Formerly a flourishing town, renowned throughout France and the world for the beauty of its great Cathedral, it was reduced practically to a mass of ruins by the German bombardment. The Cathedral of Notre Dame at Rheims, begun in 1212 and completed in the fourteenth century, was one of the finest specimens of Gothic architecture in Europe. Industrially Rheims was an important center for the manufacture of woollens (especially merino) and mixed silk and wool fabrics, and as an entrepôt for the wines of Champagne. In the early days of the Great War (1914-19) Rheims was in German possession from Sept. 4 to Sept. 12, 1914. During the rest of the war German efforts to enter it were fruitless, but it was almost continually under bombardment from Sept. 17-28, 1914, when the shelling of its great cathedral scandalized the civilized world. After four years of war all that remained of that magnificent edifice were the walls and the series of statues within the west wall. After the cessation of hos-

tilities the Knights of Columbus in the United States raised a large sum for general restoration work, and in 1924 John D. Rockefeller, Jr. gave 18,500,000 francs for reconstructing the Cathedral roof. The work of restoring the Cathedral was finally completed in 1938.

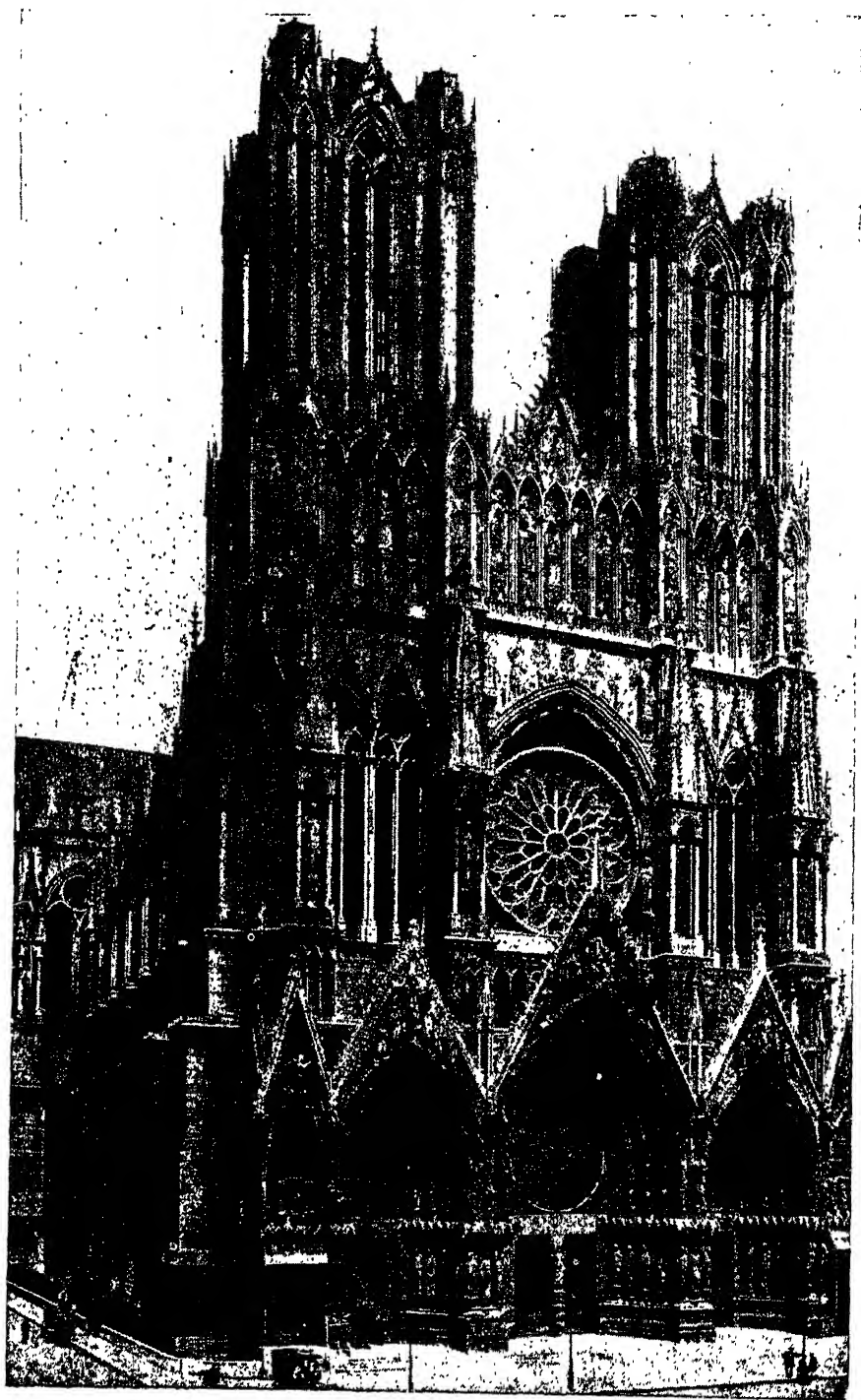
**Rheinberger, Joseph Gabriel** (1839-1901), German musical composer, was a native of Vaduz, Lichtenstein. Among his compositions are the operas *Die sieben Raben* (1869), *Türmer's Töchterlein* (1873), the *Wallenstein* and *Florentine Symphonies*, and the oratorio *Christoforus*.

**Rheostat**, a control device consisting of resistances and contacts, for changing the value of resistance between given limits. In use there are two types, the series type and the parallel type.

**Rhesus**, a small brown monkey distributed throughout Northern India. It is partly migratory and is found in troops at Simla. In the natural condition the monkeys quickly learn to come at a call for food, and are frequently attached to temples in Kashmir in a semi-domestic state.

**Rhetoric**, the art of public speaking. Its origin was due to the Sicilian Greeks, Corax and Tisias, who lived at Syracuse c. 460 B.C. Isocrates had a school attended by most of the leading men of Greece from 400-350 B.C. His own style is the model of nearly all the best European prose. About 300 B.C. the Attic school of rhetoric was superseded by the Asiatic, marked by its artificiality; in the 2d century B.C. Rhodes was famous for a rhetorical school which aimed at greater naturalness. By the 1st century B.C. the importance of rhetoric as a living study passed to Rome. From the time of Cicero onward rhetoric signified the more advanced study of language, such as would now form part of a university education. In the middle ages and in more recent times the study of rhetoric has usually meant that of literature in general; as a practical aid to oratory, rhetoric has been disused.

**Rhett, Robert Barnwell** (1800-76), American politician, was born in Beaufort, S. C. He was a member of Congress during 1837-49, and succeeded John C. Calhoun in the Senate in January, 1851. He advocated the secession of S. C. because of dissatisfaction over the Compromise of 1850, but, as his party was defeated, resigned from the Senate in disgust. For several years he was the editor of the Charleston *Mercury*, the most heated of the 'fire-eater' organs.



*Rheims Cathedral.*

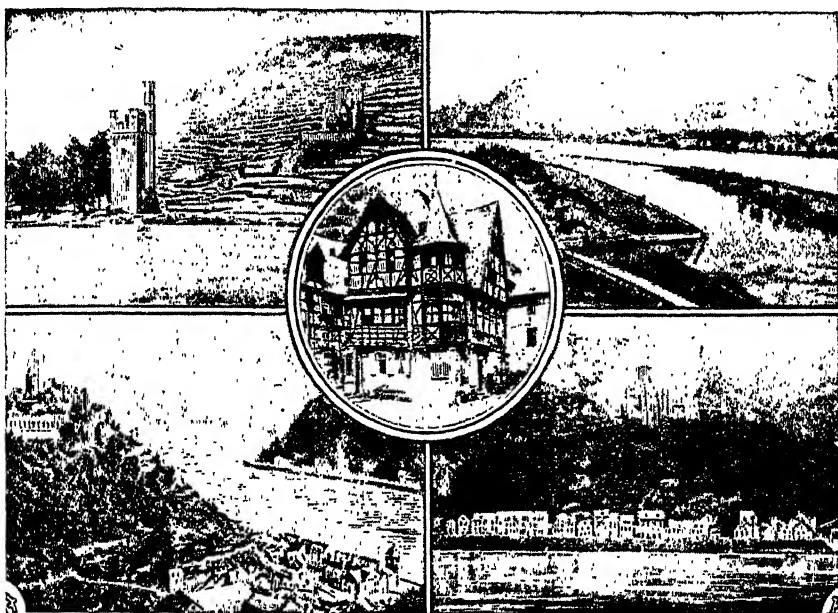
**Rheumatism, Acute and Chronic, and Rheumatoid Arthritis.** Having certain characteristics in common, these three diseases are best considered together. *Acute articular rheumatism* is generally characterized by a moderate degree of fever, by coated tongue, by profuse sweating, and by considerable pain in one or more joints. There may be slight redness over the inflamed joint. The larger joints are most frequently affected, and the inflammation may persist for weeks, but there is a form of the disease in which day by day the inflammatory process passes

and a generous diet sometimes keep it in check, or even ameliorate its symptoms.

**Rhydt**, tn., Prussian Rhine province, 19 m. by rail w. by s. of Düsseldorf. It manufactures silks and velvets, cotton goods machinery, and colored paper; p. 46,000.

**Rhinanthus**, a genus of plants belonging to the order Schrophulariaceæ. The common European cockscomb, or yellow-rattle, is a rather tall, single-stemmed plant, with a loose spike of yellow flowers in June.

**Rhine**, riv. of Germany, 760 m. in length, and draining an area of 75,770 sq. m. It



Views on the Rhine.

Upper Left, The 'Mouse Tower' and Ehrenfels, Bingen; Upper Right, Rolandseck; Center, Bacharach; Lower Left, The Lorelei Rock; Lower Right, Stolzenfels.

from one joint to another. *Chronic rheumatism* may follow an acute attack. It is manifested by subacute symptoms, the pain being less severe, the temperature lower, and the cardiac complications less frequent. But while less alarming, it is often more lingering than the acute variety of the disease. In old people the hip joint is the chief seat of chronic rheumatism. *Rheumatoid arthritis* is characterized by great wasting of the joint surfaces, by extreme thickening of the parts around the joint, and by distortions due to muscular contractions. Rheumatoid arthritis is incurable; but cod-liver oil, iron, iodides,

rises in the Swiss canton of Graubünden (Grisons). The most picturesque portion is between Bingen and Koblenz, where the river winds between mountains on either side. From Cologne to its mouth it passes through flat country. Its most important tributaries are (r. bk.) the Elz, Kinzig, Murg, Neckar, Main, Lahn, and Sieg; (l. bk.) Ill, Queich, Nahe, Mosel, and Ahr. The left or southern arm, which falls into the North Sea at the Hook of Holland, is alternately known as the Waal and the Maas. The right or northern arm splits up into the Yssel and the Rijn.

**Rhine and Rhone Canal**, constructed between 1783 and 1834, connects the river Ill (which in turn is connected with the Rhine by canal) with the Saône in France. Length, 217 m., of which 117 m. are in French territory. There are 87 locks, and it is navigable throughout for vessels drawing up to 6½ ft.

**Rhineland, or Rhine Province, or Rhenish Prussia**, prov. of Prussia, between Belgium and Luxemburg on the w. and Hesse-Nassau and Westphalia on the e. It is drained by the Rhine and its tributaries, and diversified by the Hochwald, Idarwald, Hunsrück, Westerwald, Siebengebirge, and Sauerland Mountains. On the left border are the volcanic mass of the Eifel and the Hoher Venn. The n.w. is flat and low. The higher districts are nearly all forest, and the lower given up to mining. Wine is extensively produced in the valleys of the Rhine, Moselle, and Saar. Sugar, hops, and flax are grown, and fruit is abundant. By far the most important occupations are mining and manufacturing. The principal mineral is coal, extracted around Saarbrücken and Aachen. The output amounts to nearly 30 million tons annually. Over a million tons of iron are mined. Industrially, Rhineland stands at the head of all the provinces of both Prussia and the empire. The iron works are concentrated in Essen (Krupp's cannon foundry), Duisburg, Düsseldorf, Cologne, Neunkirchen, and Aachen. Solingen and Remscheid are famous for their cutlery; Aachen and Burtscheid for their needles and cloth and woollens; Crefeld for silk, velvet, and woollens; Elberfeld-Barmen for cottons, Turkey-red dyeing, and silks; Cologne for scent; Duisburg for cottons and chemicals; Treves for stone-dressing for building churches; Düren and Juliers for paper; Koblenz for wines. Sugar, beer, spirits, brass, linen, leather, glass, pottery, and mosaics also are produced on a large scale. The capital is Koblenz; area, 10,323 sq. m.; p. 7,120,519. The industrial parts of the province were heavily bombed in World War II.

**Rhine, Rhenish, or German Wines**, names given to the products of the vineyards bordering on the Rhine, Moselle, and Main. Still and sparkling white and red wines are produced. Moselle wines are in general lighter and more acid than those from the Rhines. Rhine wines are also made from the grapes of California vineyards. See **HOCK**; **MOSELLE**.

**Rhinoceros**, a genus of perissodactyle ungulates. Living species are confined to Africa and Asia, but the extinct species lived in Europe and North America as well as in Asia. From their allies, the tapirs, the rhinoceroses differ in having only three toes on each foot, in the character of their cheek teeth, and usually in the presence of one or two median horns on the front of the head. The rhinoceros is a bulky animal, taller than the hippopotamus, though not quite so long in the body. All the species are purely herbivorous. There are three living Asiatic species, of which the largest is *R. unicornis*, the one-horned Indian rhinoceros, not infrequently seen in captivity. The smaller *R. sondaicus* is found through Burma and the Malay Peninsula to Sumatra, Java, and Borneo; while the third species (*R. sumatrensis*) occurs throughout almost the same region, but is absent from Java.

**Rhinoceros Beetle**, a large grayish, scarabid beetle (*Dynastes titus*) of the South-eastern United States, the male of which has a tall, curved horn upon the head and another projecting forward from the throat.

**Rhinoplastic Operations** are performed with a view to remedying the unsightliness caused by entire or partial loss of the nose. The Indian operation was introduced into Great Britain in 1814. By this method a leaf-shaped flap is dissected from the forehead, and is twisted downward so as to occupy the site of the missing nose. The space on the forehead may be partially closed by sutures. At a later date the edges are pared and sutured to the nasal stump; and still later the *columna nasi* is formed by dissecting a narrow perpendicular flap from the upper lip and by sliding it upward to meet the tip of the nose, where it is secured by stitches.

**Rhinoscopy**, in medicine, the examination of the interior of the nose.

**Rhizome**, a root-stock or thick, procumbent, rootlike stem, which lies partly or entirely below the surface of the soil, and emits roots or rootlets from its under side, and herbaceous stems or leaves from its upper side.

**Rhizopoda**, a class of Protozoa, consisting of minute naked or testaceous protoplasmic forms of rudimentary structure, which move by means of pseudopodia of defined types. The rhizopoda have been subdivided into the orders *Amœbina* and *Conchulina*, the former being naked and the latter testaceous; and



each order has been further subdivided according to observed types of pseudopodia and of tests.

**Rhode Island**, one of the 13 original States of the United States, and one of the New England group of States. It is bounded on the north and east by Massachusetts; on the south by the Atlantic Ocean; and on the west by Connecticut. It has a total area of 1,248 sq. m., of which 181 are water. It is the smallest State in the Union. Rhode Island lies almost wholly in the Piedmont Plain; and the surface is generally rough and hilly. The State is divided into two unequal portions by Narragansett Bay, an arm of the sea which varies in width from 3 to 12 m. A striking feature of the surface is the great number of lakes, called ponds or reservoirs. The principal rivers are the Blackstone in the northeast, the Pawtuxet in the middle, and the Pawcatuck in the southwest. The climate is fairly equable, but the extremes become greater as one leaves the coast. The geological formations of the State belong to the Archæan and Palæozoic eras. The Archæan rocks are the granites and gneisses of the western part. The leading mineral industry is stone quarrying, which includes production of limc. Much sand and gravel are shipped. Clay products, coke, mineral waters and trap rock are also produced. The shell fish industry is very extensive; oysters, clams, quahaugs and scallops are shipped as far as Canada and California.

Rhode Island, originally forest clad, has been long cleared and largely reduced to cultivation. The total farm land in 1935 was 307,725 acres, of which one-third \*was improved, and one-third was woodland. The total value of farm property was \$35,237,660. The principal crops are: hay and forage, white potatoes, corn and oats. Apples, peaches, pears, plums, prunes and cherries are also grown. Milk dairying is the chief agricultural industry. Rhode Island is pre-eminently a manufacturing community, and the growth and concentration of population in the State have been closely related to the increase in its manufacturing industries. The transportation facilities are excellent. Providence, the largest city, is one of the most important seaports in New England, while the State is traversed by the main line of the most important railway system in New England, giving it direct connection with other parts of the country. The textile industries of the State—consisting of the manufacture of wool-

en and worsted goods, cotton goods, silk and rayon and knit goods—are by far the most important. In Providence practically all the jewelry of the State is manufactured. Pawtucket, Woonsocket, Central Falls, Cranston, Bristol, West Warwick, East Providence and North Providence are important manufacturing centers. According to the Federal Census for 1940, the population of Rhode Island was 713,346. The population of the principal cities in 1930 was: Providence, 253,504; Pawtucket, 75,797; Woonsocket, 49,303; Cranston, 47,085. Institutions of higher learning include Brown University and Providence College, both at Providence; and the Rhode Island State College, at Kingston. The present constitution of Rhode Island is that drawn up in 1842, as since amended. The legislature, or General Assembly, consists of a Senate of 39 members, besides the lieutenant-governor, who is *ex officio* president, and a House of Representatives of 100 members, all elected biennially. There is one Senator from each town or city. Representatives are elected by towns and cities according to population. Under the Reapportionment Act, Rhode Island has 2 Representatives in the National Congress. Providence is the State Capital.

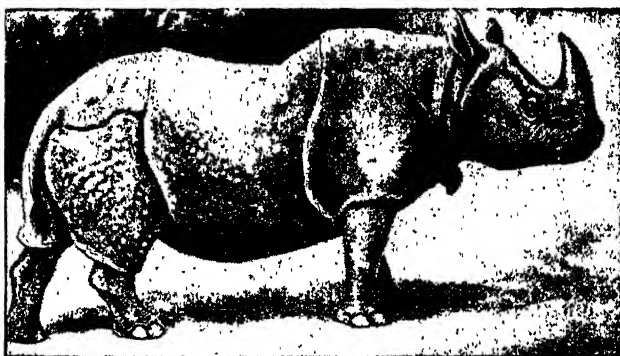
Narragansett Bay was explored in 1524 by Verrazano, and in 1616 by Adrian Block. In 1636 Roger Williams, a fugitive from Massachusetts intolerance, settled with five companions at Providence. Two years later he obtained an extensive grant of land from the Narragansett Indians, and founded a community based upon the principles of equality, freedom of conscience, and separation of church and state. The same year he persuaded the followers of Anne Hutchinson to settle on Aquidneck Island, which he obtained for them from Miantonomoh, a Narragansett Indian chief. This band, at whose head was William Coddington, settled at Portsmouth, but frequent quarrels led to the founding of Newport in 1639. A fourth settlement in Rhode Island was made at Warwick in 1634 by Samuel Gorton. The formation of the New England Confederation in 1643 threatened the independence of the colony, and Williams went to England to secure protection. In October, 1652, the charter and union of all the settlements in Rhode Island was confirmed; but it was not until 1657 that they were actually reunited. On July 8, 1663, Clarke, who had been left in England as agent of the colony, obtained

from Charles II. a charter granting practically complete self-government. During the Colonial period Rhode Island was the refuge of all the oppressed, whether Catholics or Quakers. It was one of the first Colonies to resist English oppression. In 1787 the Anti Federalists were in control of the State, and refused to send delegates to the Constitutional Convention at Philadelphia. The Constitution was finally submitted to the several town meetings of Rhode Island, and was rejected. Later, in 1790, when Congress threatened to cut off all trade—Rhode Island ratified the Constitution by a majority of two votes in the convention.

*ing America* (1923); Carroll's *Outline of Government in Rhode Island* (1924).

**Rhode Island State College**, a co-educational institution of higher learning at Kingston, Rhode Island, under Federal and State auspices. See *Taule* under the heading **UNIVERSITY COLLEGE**.

**Rhodes**, or **Rhodos**, island, 12 m. distant from the coast of Asia Minor, in the Mediterranean Sea. It came under Italian sovereignty in 1923. The interior is mountainous, reaching an elevation of 4,000 ft. in Mount Attayaro. The climate is good, but earthquakes are not infrequent. The valleys and coastal belt are fertile, yielding figs, oranges, lem-



*Rhinoceros.*

After the Revolution, Rhode Island recovered some of its maritime importance, but this was ruined by the War of 1812. The State then turned to manufacturing. In 1793 the first successful cotton factory had been set up at Pawtucket. With the rapid growth of cities, the old charter of 1663 became obsolete. By 1840 the condition had become unendurable. Though 'Dorr's Rebellion' failed, it nevertheless brought about the framing of a new constitution, in virtue of which representation was reapportioned, the franchise extended, and an independent judiciary established. The constitution was amended a number of times between 1854 and 1903. In 1930 Mount Hope Bridge was completed at a cost of \$4,000,000, uniting Rhode Island proper and the original Providence Plantation. In national politics Rhode Island was Republican from 1856 to 1912, in which year the State supported Woodrow Wilson. In 1916, 1920 and 1924 it was Republican, and in 1928, 1932, 1936, 1940, Democratic. Consult Adams' *Rhode Island's Part in Mak-*

ons, pomegranates, grapes, and vegetables. Wine, silk, oil, and leather are the chief manufactured products. Fresh fruits and vegetables, olive oil, hides and leather, onions and potatoes, figs, wine, sponges, and soap are exported. The capital is Rhodes, founded 408 B.C., on the n.e. coast. Area of the island 550 sq. m.; p. 31,000. In the second millennium B.C. the population of Rhodes was possessed of the Mycenaean civilization. From early days Rhodes was a place of commercial prosperity. In 334 B.C. they became subject to Alexander; but after his death, in 323, they reasserted their independence. A subsequent alliance with Ptolemy of Egypt led to the famous siege of their chief city, Rhodes, by Demetrius Poliorcetes. In 304 he abandoned the siege, and the Rhodians erected their famous Colossus from the proceeds of the engines of war which he left behind. During the third century B.C. the Rhodians enjoyed independence, and about 200 B.C. allied themselves with Rome. The last blow to the prosperity of Rhodes was an earthquake, which

ruined the city, in 157 A.D. Rhodes became the capital of the insular province under the Roman emperors, and suffered invasions from the Saracens under the Byzantine Empire. It was besieged by the Turks in 1480, and again in 1522, when they captured it. After remaining under Turkish rule for nearly four hundred years, the island was seized by an Italian force on May 4, 1912, in the course of the war between Turkey and Italy. It was ceded to Italy in 1924 and renamed Rodi.

**Rhodes, Cecil John** (1853-1902), British colonial statesman, and for nearly a quarter of a century the dominating personality on the imperial side in South African politics, was born in Bishop Stortford, Hertfordshire. He went to Natal in 1870; and on the discovery of diamonds proceeded to Kimberly, where he laid the foundations of his great wealth. The territory which ultimately came under the control of the company, of which Rhodes was one of the directors, is now known as Rhodesia. One of the projects promoted by him was the Cape-to-Cairo Railway. From 1890-6, Rhodes filled the office of premier of Cape Colony. He resigned after the Jameson Raid, for which he held himself 'morally culpable.' When the South African War broke out (1899), he took part in the defence of Kimberley. By his will Rhodes bequeathed practically the whole of his fortune and possessions, valued at about \$30,000,000 to the public service. To his old college, Oriel, at Oxford, he bequeathed \$500,000 for a system of free scholarships (see RHODES SCHOLARSHIPS). Consult Hensman's *Cecil Rhodes* (1902); Fuller's *Cecil Rhodes* (1910); Fort's *Alfred Beit* (1932).

**Rhodes, James Ford** (1848-1927), American historian, was born in Cleveland, Ohio. He entered business in his native town in 1870, and retired in 1885, thereafter devoting himself to the task of writing a *History of the United States from the Compromise of 1850*. This work, in seven volumes, gives an account of political, economic, social, and intellectual conditions during the period of 1850-77. He was president of the American Historical Association in 1899.

**Rhodes, Colossus of.** See **Colossus**.

**Rhodesia**, territory, British South Africa, having an area of 436,950 sq. m. The country is divided by the Zambezi River into Northern (area, 287,950 sq. m.) and Southern (area 149,000 sq. m.) Rhodesia. In Southern Rhodesia is a plateau 3,500 to 6,000 ft. in height. In Northern Rhodesia are the

table lands of the Matoka and Tanganyika plateaus, the latter of which forms the watershed between the Congo and Zambezi Rivers; and the Muchinga Highlands (4,000 to 5,000 feet). The climate on the plateau is bracing and suitable for European settlement. Indigenous vegetation includes a wide variety of tropical flowers and grass, palms, mimosa, and banana, rubber, Rhodesian teak, cedar, fig, and Kaffir plum trees. Among the fauna are the elephant, hippopotamus, rhinoceros, lion, leopard, several species of antelopes, mongoose, wolf, ant-eater, python and cobra, crocodile, ostrich, crane, and numerous other varieties of birds. Gold, silver, copper, diamonds, coal, lead, zinc, tin, chromite, tungsten, wolfram, scheelite, and asbestos are found. Great deposits of rich copper ore have recently been discovered in Northern Rhodesia and working has commenced. The acreage under crops is small, but is being extended. Maize, wheat and oats, sweet potatoes, cassava, ground-nuts, castor seed, rice, and fruits are grown; while the cultivation of tobacco and cotton has made considerable progress. Ranching on a large scale is being extended and, encouraged by a Government bounty. The population of Rhodesia in 1941 was 69,013 Europeans and 1,379,382 natives, in Southern Rhodesia, and 15,188 Europeans



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*Rhododendron Delicatissima.*

and 1,372,235 natives, in Northern Rhodesia.

Until 1923 the country was administered by the British South Africa Company (chartered in 1889), as prescribed by the Orders in Council of the British Government, but in

that year a new form of government was established consisting of a governor, assisted by a legislature and an executive council. The legislature consists of a single legislative assembly, but that body may constitute a legislative council in addition, if it so desires. The Crown reserves the right to disallow laws. In Southern Rhodesia the seat of government is Salisbury; in Northern Rhodesia, Livingstone. The numerous ruins of so-called temples, walls, conical towers, and the like, have been thought to be of mediæval origin, built by negroes nearly related to the Bantus. (See ZIMBABWE.) Authentic history begins with this mediæval Bantu race, who, having partially emerged from savagery, traded with the Arab settlers of the eastern coast. Rhodesia was explored by David Livingstone, who died at a place called 'Old Chitambo,' south of Lake Bangweolo. The country was brought under British influence largely through the activities of Cecil Rhodes. A long-drawn-out struggle with the Matabili was concluded in 1907. The country remained under the rule of the British South Africa Company until 1923, during which time its resources were developed and it showed a slow but steady increase in material prosperity. In 1923 Southern Rhodesia was annexed to the British Empire. Northern Rhodesia was taken over by the British Government in 1924 and is administered by a governor and an executive and legislative council. Consult Maciver's *Mediæval Rhodesia* (1906); Jollie's *The Real Rhodesia* (1924); Hole's *The Making of Rhodesia* (1926).

**Rhodes Scholarships**, an educational foundation, established by the will of Cecil Rhodes, which created a fund for free scholarships at Oxford University. Of these scholarships, one hundred and two are assigned to the British Empire and ninety-six to the United States, each State being entitled to two. The selection is made by representatives of the colleges.

**Rhodium**, Rh, at. w. 102.91, an element of the platinum family that occurs associated with platinum and other metals of the platinum group in the native platinum minerals.

**Rhododendron**, a genus of ornamental shrubs belonging to the order *Ericaceæ*. The flowers, varying in color from pale pink to deep rose, are generally borne in racemose corymbs, the individual flowers being generally large and more or less campanulate in

form while the leaves are usually evergreen.

**Rhodopis**, courtesan of ancient Greece, who lived about 600 B.C. was by birth a Thracian. There was a legend current among the Greeks that she built the third pyramid.

**Rhondda**, river, Wales, in Glamorganshire. The upper valley is noted for its scenery; the lower valley, known as the Rhondda valley, is a densely populated coal-mining district.

**Rhône**, department, France, on the right bank of the middle Rhône and lower Saône; area, 1,104 sq. m. It is mountainous except for the valley of the Saône and the narrow plain east and south of Lyons. Corn, wine, and potatoes are the chief agricultural products. It is an important industrial region, especially for textiles; Lyons, the capital, is the chief center; p. 956,566.

**Rhone**, one of the principal rivers of France, rises on the western slopes of Mount St. Gothard in Swiss Alps, and discharges into Gulf of Lyons. Its length is about 500 m. The chief tributaries are—on the right, the Ain and Saône, and on the left, the Arve, Isère, Drôme, and Durance. Near Arles it branches into the Grand and the Petit Rhône, which enclose the fan-shaped delta of the Camargue. Canals provide means of communication between the main channels of the Rhône and the Mediterranean.

**Rhubarb**, or **Pie Plant**, a perennial plant (*Rheum rhaponticum*), cultivated for its juicy, acid leaf-stalks, which are used in the making of pastry, sauce and wine. The medicinal rhubarb (*Rheum officinale*) much resembles the garden rhubarb in appearance, but is of larger growth.

**Rhus**, a genus of trees and shrubs belonging to the order Anacardiaceæ. They are mostly poisonous plants.

**Rhyme**, or more properly **Rime**, a word meaning the recurrence of the same sound in a verse or verses. It is probable that rhyme, as employed in modern European literature, first made its appearance in Latin hymns and songs at the period of the decadence of the old strict prosody, and of the change from a quantitative to an accentual scheme of scansion. It is certainly a mode of emphasis which comes naturally to human beings everywhere, and it is found in literatures which owe nothing to Western influences—as, for example, that of China. In English, to constitute a perfect rhyme, the accented vowels and all that follows them (whether consonants or vowels) must be exactly alike in the rhyming words. But the

consonantal sounds preceding the accented vowels must differ. The charm of the sonnet lies almost wholly in its arrangement of rhymes. Consult Saintsbury's *History of English Prosody from the Twelfth Century to the Present* (3 vols.).

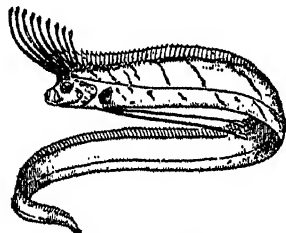
**Rhyolite**, a variety of felsitic or porphyritic igneous rocks distinguished by the presence of quartz and orthoclase as essential mineral constituents.

**Rhys, Ernest** (1859- ), English author, was born in London. He practised as a mining engineer from 1877 to 1885, when he adopted literature as a profession. He has written among other works, *A London Rose* (1894), *The Man at Odds* (1904), *Gwenevere, a Lyric Play* (1905), *The Leaf Burners* (1918), *Modern English Essays* (1922), *Black Horse Pit* (1925), *Everyman Remembers* (an autobiography, 1931), *Rhymes for Everyman* (1933). Editor of *Everyman's Library*.

**Rhythm**, a combination of sounds producing a certain harmony or cadence at recurring intervals, applied especially to verse, wherein it is definite and anticipated, but existing less definitely in prose. With melody and harmony it forms one of the three great elements of music. In the best prose and in oratory it is a strongly marked characteristic.

**Rhytina**, the genus to which belongs Steller's sea-cow (*R. stelleri*), an extinct member of the order Sirenia, which formerly inhabited the shores of Bering and Cooper Islands in the North Pacific. It was discovered by Bering in 1741, and by 1768 had been virtually exterminated.

**Ribbentrop, Joachim von** (1893- ), German statesman. He was for years a wine merchant. He helped to form the Nazi party, becoming (1936-38) Germany's ambassador to Great Britain and, in 1938, foreign minister.



*Ribbon Fish.*

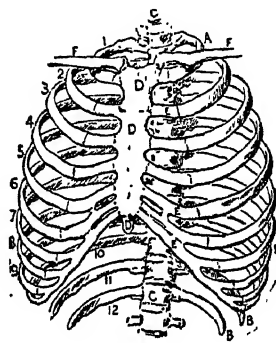
**Ribbon Fish**, deep-sea fish, characterized by a very long narrow body which may reach a length of from fifteen to twenty feet,

a depth of from ten to twelve inches, and a breadth of only an inch or two at the thickest part.

**Ribbon Snake**, a species of slender and swift garter snake (*Eutania saurita*), common in the Eastern states where it lives on the borders of bogs or ponds.

**Ribes**, a genus of hardy, deciduous shrubs belonging to the order Saxifragaceæ. See CURRANT; GOOSEBERRY.

**Ribot, Alexandre Félix Joseph** (1842-1923), French statesman, was born in St. Omer. He was premier in 1893 and again in 1895. In the Dreyfus affair he successfully opposed the prosecution of Mercier, although he had previously urged all possible publicity. In 1906 he was elected to the French Academy.



*Ribs*

A, A, True ribs; B, B, false ribs; C, vertebral column; D, sternum; D1, manubrium sterni; D2, ensiform process; E, E, cartilages; F, F, clavicles.

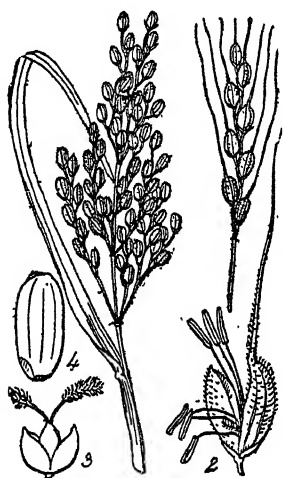
**Ribs**, flat curved bones which, together with the vertebrae behind and the sternum or breastbone in front, make the framework of the thorax or chest. In man there are twelve ribs on either side. There are on each side seven 'true' ribs, connected with the breastbone in front and the spinal column behind, and five 'false' or 'floating' ribs, the upper three being connected in front with the cartilages of the ribs above them. The lowest two have free extremities in front.

**Ricardo, David** (1772-1823), English political economist, of Jewish origin, was born in London. Although he has given his name to a system and method known as Ricardian economics, his writings were at best mere occasional pieces, and his views often find better exposition in the writings of J. B. Say, Mal-

thus, and M'Culloch. His chief work is entitled *Principles of Political Economy and Taxation* (1817). Ricardo is the chief representative of the purely deductive method in the science. His treatment of rent, profits, and wages amounted to a revolution in political economy.

**Rice** (*Oryza sativa*), a cereal grass indigenous to Asia, forming the staple food of more than half the inhabitants of the globe. In China nearly 5,000 years ago the sowing of rice was an important religious ceremonial.

There are several members of the *Oryza* family but the only one of any importance is *O. sativa*, the common rice of commerce. The Spaniards probably introduced it into South America and it is said that it was cultivated in Virginia as early as 1647. The rice plant



Rice

1, Bearded; 2, flower; 3, pistil; 4, caryopsis.

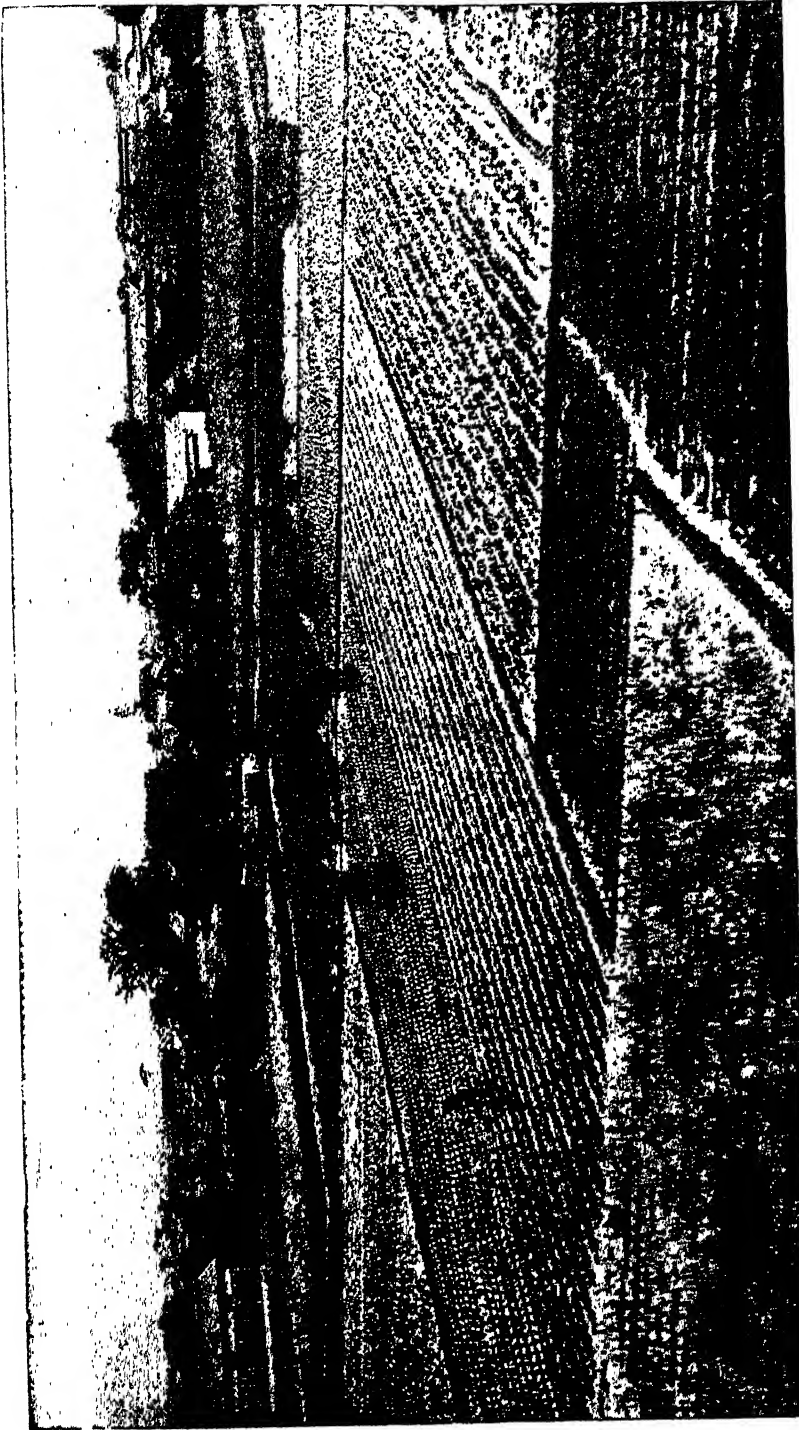
is an annual varying in height from one to 5 or 6 ft., one variety, known as 'giant rice' attaining a height of 12 or 15 ft. There are at least 5,000 varieties, nearly 1,000 of which have been grown in the United States. It has long tapering leaves and the flowers appear as single-flowered spikelets in panicles 8 to 12 inches long. The grain consists of four parts; the outer husk, usually golden in color, the cuticle or inner skin, varying from a creamy white to a mahogany red and consisting of nitrogenous cells, the kernel or actual rice grain, consisting of minute starch cells, and the germ. Rice cultivation may be broadly divided into two classes, upland or dry cultivation, and lowland or wet cultiva-

tion. Both methods require a fairly high temperature and a good supply of moisture. The upland or dry method is similar to that of other grains. By far the greater proportion of rice is produced by the lowland method. The varieties most abundantly cultivated require a high summer temperature and must be grown in fields capable of being flooded at certain stages of their growth. In the world's greatest rice-producing countries the harvesting is done by hand and by native labor.

After the grain is dried sufficiently it is threshed and stored ready for the mill. After coming from the thresher it is known as 'paddy,' consisting of the grain proper, the cuticle and the husk, which two last-named are removed by milling. Finally it is polished by friction and is then graded, barrelled and ready for market.

**Insect Pests and Diseases.**—Chief among the insect pests are the rice bug (*Leptocoris acuta*), which feeds on the rice panicles, or heads, when formed; the stink bug (*Ebalus pugnax*), which punctures the kernel in the early stages so that it shrivels and becomes valueless; the rice water weevil (*Lissorhoptrus simplex*), which attacks the roots and leaves of the growing plant; and the moth (*Chilo Plejadellus*), whose larvæ feed on the stem of the rice. The disease or fungoid growths to which rice is most liable are 'blast,' which attacks it at the juncture of leaf blade and sheath causing the plant to dry up and a failure of the grains to fill; 'green smut' and 'black smut,' which attack the actual grains. As a food rice is nutritious and easily digested. One hundred pounds of cleaned rice contains 87.7 pounds of nutrients, consisting of 8 pounds of protein, 0.3 pounds fat, 79 pounds carbohydrates, and 0.4 pounds of ash. The removal of the cuticle of rice in order to procure the pure white article as we usually see it, also removes part of the protein, fat and mineral matter and a large part of the vitamin B., but, even so, polished rice still remains valuable and nutritious. Brown or unpolished rice can be obtained at the better stores. Japanese beer (saké) and Chinese 'shemshu' are distilled from rice and in Japan the straw is made into hats, mats, sandals, and screens.

**Rice, Alexander Hamilton** (1875- ), American geographer and explorer, born in Boston. He has devoted much time to scientific exploration in tropical South America and has mapped over 500,000 sq. m. of that



*Rice Fields in Japan.*  
Fields of full grown rice and cutover ground flooded for replanting.

© Ewing Galloway, N. Y.

country in addition to collecting geological and biological data. He is now professor of geographical exploration and director of the Institute of Geographical Exploration founded by him at Harvard. He has received numerous awards from both American and foreign societies.

**Rice, Alice Caldwell (Hegan)** (1870-1942), American author, was born in Shelbyville, Ky. Her first book *Mrs. Wiggs of the Cabbage Patch* (1901), was at once accepted, and is known in every place where English is spoken. In 1902 she was married to Cale Young Rice, poet and dramatist. Her other publications include *Lovey Mary* (1903), *Mr. Opp* (1909), *Quin* (1921), and *Mr. Pete & Co.* (1933).

**Rice, Cale Young** (1872-1943), American poet and dramatist, born at Dixon, Ky. He is the husband of Alice Hegan Rice. His works include *Sea Poems* (1921), *Yolanda of Cyprus*, grand opera (1929), and *The Swamp Bird*, play (1931).

**Rice, Elmer** (1892- ), American playwright born in New York City. His play *The Adding Machine*, was first produced by the Theatre Guild in New York in 1923. In 1929 his *Street Scene* was awarded the Pulitzer prize. His more recent plays include *Counsellor-at Law* (1931); *We, the People* (1933); *Flight to the West* (1941).

**Rice, George Samuel** (1866- ), mining engineer born at Claremont, N. H. He has been chief mining engineer of the U. S. Bureau of Mines since its formation in 1910 and in charge of a series of investigations in which coal dust explosions are produced in a government experimental mine in order to study underlying causes of such accidents.

**Rice, Joseph Mayer** (1870-1934), author, born at Philadelphia. He founded the Society of Educational Research in 1903 and was editor of the *Forum* from 1897-1907. His works include, *Scientific Management in Education* (1913); *The People's Government* (1915).

**Rice-bird**, a name given both to the bobolink and to the Java sparrow or paddy-bird (*Munia oryzivora*), an East Indian finch, frequently kept as a cage bird in Europe. Both birds commit great ravages in the rice fields.

**Rice-paper** is not made from rice, but from the pith of a tree (*Fatsia Aralia papyrifera*) grown in Formosa.

**Richard I., Cœur de Lion** (1157-99), king of England. On his accession (1189) he devoted all his efforts to raising money to

enable him to go on a crusade. He sailed for the East, December, 1190. In June, 1191, he arrived at Acre, where he met Philip of France. Richard's energy and prowess contributed to the capture of Acre, and having defeated the Saracens at Arsuf, he arrived within a few miles of Jerusalem. But in January, 1192, he was forced to retreat. On his way home he was made prisoner by Leopold, Duke of Austria, who handed him over to the Emperor Henry VI., and it was not till 1194 that he was released on payment of a ransom. After Richard's arrival in England (1194) John was easily reduced to submission. Richard was killed while attacking Chalus. See Archer's *The Crusade of Richard I.* (1889).

**Richard II.** (1367-1400), king of England, was the son of the Black Prince, and ascended the throne (1377). In 1381 Wat Tyler's rebellion took place, and Richard showed great presence of mind when he met the rebels. Thomas of Gloucester, the king's uncle, took the lead in attacking the king; and when Richard asserted his rights, he and others seized London, and overthrew the king's friends. In 1389, however, Richard resumed the government. At Shrewsbury, in 1398, Parliament handed over its authority to a standing committee. In February, 1399, Richard seized the estates of John of Gaunt, who had just died, and in May he sailed to Ireland. During his absence Bolingbroke returned, and capturing Richard at Flint, deposed him, and became king. It is supposed that Richard was murdered in Pontefract Castle.

**Richard III.** (1452-85), king of England, was a son of Richard, Duke of York, who was killed at the battle of Wakefield, and a younger brother of Edward IV. On July 6, 1483, he was crowned king, and about a month later the two princes, Edward V. and his brother, were murdered in the Tower of London. Buckingham invited Henry, Earl of Richmond, to come over to England and receive the crown. The conspiracy failed. However, Buckingham was executed, and his chief associate, Morton, bishop of Ely, fled to Flanders. Richard protected English trade abroad, organized the naval and postal systems and improved the administration of justice. On August 22, Richard was defeated and killed at Bosworth Field. See Gairdner's *Life and Reign of Richard III.* (1878).

**Richardia**, a genus of S. African marsh plants belonging to the order *Araceæ*. Much



the best known and most frequently grown species is *R. africana*, the calla-lily, or lily of the Nile.

**Richards, Ellen Henrietta** (1842-1911), American educator, born in Dunstable, Mass. She was an instructor in the women's chemical laboratory in the Institute of Technology, and chemist to the Manufacturers' Fire Insurance Co., and assistant chemist to the State Board of Health. She specialized in oil and water analysis, and in the chemistry of foods. Her publications are: *Chemistry of Cooking and Cleaning* (1882); *Food Materials and their Adulterations* (1886); *Home Sanitation* (in conjunction with Dr. Talbot, 1887); *The Cost of Living* (1899); *Air, Water, and Food* (1900); *The Cost of Food* (1900); *First Lessons in Food* (1905); *The Art of Right Living* (1905).

**Richards, Theodore William** (1868-1928), American chemist, born in Germantown, Pa. In 1894 he was appointed assistant professor of chemistry in Harvard, and in 1901 became professor and head of the chemical department. He assisted in revising the atomic weights of oxygen, zinc, iron, and other elements. In 1914 he became president of the American Chemical Association.

**Richards, William Trost** (1833-1905), American marine painter, born in Philadelphia and a pupil of Paul Weber. He excelled in the painting of surf scenes, of which there are examples in the Metropolitan Museum of New York, the Philadelphia Academy, the Corcoran Gallery in Washington.

**Richardson, Henry Hobson** (1838-66), American architect, born in St. James Parish, La. In 1875 he settled in Boston, where his most important work was done, notably Trinity church, the most imposing church edifice in New England. Other impressive buildings of his designing are the New York State Capitol at Albany.

**Richardson, Samuel** (1689-1761), English novelist, was born in Derbyshire. His gift of letter-writing led to the publication of *Pamela* (1740). In *Clarissa* Richardson took a higher flight. *Sir Charles Grandison* (1753) is a contrast and counterpart to *Clarissa*, the pattern of masculine as *Clarissa* is of feminine excellence. An edition of his *Works* in 19 vols. appeared in 1905 (Pickering Club Classics).

**Richardson, William Adams** (1821-96), American jurist born in Tyngsborough, Mass. In 1869 President Grant appointed him assistant secretary of the treasury. His management of the Treasury during the financial

troubles in America in 1873 was highly successful. In 1874 he left the Treasury to become a judge of the Court of Claims, and in 1885 was promoted by President Arthur to be chief justice of that court.

**Richberg, Donald Randall** (1881- ), lawyer, was born in Knoxville, Tenn. He was chief counsel for the railway unions in the government injunction suit, 1922; general counsel for the National Conference on Valuation of Railroads, 1923-33, and for the Railway Labor Executives Association, 1926-33. He was co-author of the Railway Labor Act passed by Congress in 1926, and the National Industrial Recovery Act in the Franklin D. Roosevelt administration, 1933. He was general counsel for the NRA from 1933 until August, 1934, when he succeeded Gen. Hugh Johnson as administrator.

He also became executive director of the National Emergency Council, the general co-ordinating agency of the New Deal. The President gave Richberg practically dictatorial powers over New Deal legislation in the 1935 Congressional session, allowing him to serve as the clearing house through which all suggestions for new emergency measures should pass. Later, Frank C. Walker of Montana was reappointed head of the Emergency Council, the White House explaining this was done to allow Richberg to devote his energies to the NRA. After the Supreme Court declared NRA illegal, Richberg suspended the business codes.

**Richelieu, Armand Jean Duplessis de** (1585-1642), French statesman, was born in Paris, and consecrated bishop of Luçon in 1607. In 1622 he received the cardinal's hat from Pope Gregory xv., and in 1624 he was recalled to office by Louis XIII. From this time till his death he ruled France. He had summed up his own achievements in the words: 'I employed all my energy to ruin the Huguenot faction, to humble the pride of the nobles, to reduce all subjects to their duty, and to exalt France to its proper position among foreign nations.' He put an end to the internal disorders which the war of religion had bequeathed to France and gave despotic power to the monarchy. But his greatest achievements were in foreign politics. He is also famous as the founder of the French Academy.

**Richelieu, Chambly, or St. John**, river, Quebec, Canada. It has its source at L. Champlain and flows in a straight course north by e. for about 80 m., discharging into the

s.w. end of L. St. Peter on the St. Lawrence R. The Richelieu connects the navigation of the Hudson and St. Lawrence Rivers.

**Richepin, Jean** (1849-1926), French poet, novelist, and dramatist, born at Médéa (Algiers). A tendency to brutality and morbidity marked his earlier writings, such as his



Cardinal Richelieu.

poems, *Chanson des Gueux* (1876), whose publication resulted in his imprisonment and fine for its immorality: *Les Caresses* (1877), *Les Blasphèmes* (1884), and such novels as *Les Morts Bizarres* (1876), *La Glu* (1881), and *Le Pavé* (1883). Some of his later novels however, are clever examples of psychological analysis, as for example, *Sophie Monnier* (1884), *Grandes Amoureuses* (1896). His best work is contained in his plays. *Nana Sahib* (1883), *Le Flibustier* (1888), *Par le Glaive* (1892), *Les Truands* (1889), *La Reine de Tyr* (1900), and *La Cavalière* (1901).

**Richmond**, borough of New York City, coextensive with Staten Island. (q.v.)

**Richmond**, city, Virginia, capital and largest city of the State, and county seat of Henrico co., is situated on the James River; 100 m. s. of Washington. Within a few miles of the city are the battle grounds of Seven Pines, Fair Oaks, Yellow Tavern, Cold Harbor, Frazier's Farm, Malvern Hill, Drewry's Bluff, The Crater, Gaines' Mill.

Shockoe Hill, in the center of the city, is the site of Capitol Square, which covers 12 acres. On the highest point, surrounded by fine shade trees, stands the capitol building, erected in 1785. It was designed by Thomas Jefferson, partly after the Maison Carrée at

Nîmes. Of historic interest are the house occupied by Jefferson Davis while President of the Confederacy, containing Confederate relics; the Valentine Museum, containing a fine collection of archæological specimens; St. John's church, built in 1740, where Patrick Henry uttered his famous 'Give me Liberty or Give me Death,' during the Virginia convention; the home of General Lee, now occupied by the Virginia Historical Society; and the home of John Marshall, first chief justice of the United States.

Educational institutions include Richmond University and Richmond Woman's College, and the University of Virginia College of Medicine. The leading industries are the manufacture of tobacco, iron and steel, locomotives, woodwork, and paper; p. 193,042.

*History.*—Richmond was settled in 1737 and incorporated in 1742, and in 1779 became the capital of the State. In the Revolution the place was taken by a British force under Benedict Arnold, Jan. 5, 1781, and the warehouses and public buildings were burned. The following year the city was chartered. Richmond, as the capital of the Confederacy, was the main objective of Federal operations during the Civil War. It was evacuated April 2, 1865.

**Richmond**, town, in Surrey, England, formerly known as Sheen, is situated on the slope of a hill rising from the right bank of the Thames; 9 m. southwest of London. Among the places of interest are the palace



Donald R. Richberg.

erected by Edward III., and White Lodge, the birthplace (1894) of Edward, Prince of Wales. Richmond Park of over 2,000 acres, lies to the south, while on the north is the

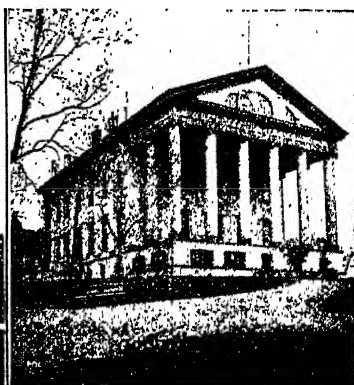
Old Deer Park, in which stands Kew Observatory; p. 37,791.

**Richmond, University of**, an institution for higher learning located in Richmond, Va., was founded in 1832 as the Virginia Baptist Seminary, chartered in 1840 as Richmond College, and in 1920 as the University of Richmond. It was closed during the Civil War, but was reopened in 1866, when a new endowment was obtained.

**Richter, Johann Paul Friedrich** (1763-1825), generally known as JEAN PAUL, German humorist, was born in Wunsiedel, near Bayreuth. Among Jean Paul's earlier writings are *Die unsichtbare Loge* (1793); *Schulmeisterlein Wuz* (1793), probably his master-

order Euphorbiaceæ. *R. communis*, the castor oil plant, an African native, is much cultivated as an annual garden plant, on account of its large, palmate leaves, and tropical aspect.

**Rickets**, or **Rachitis**, an acquired disease of infancy and early childhood chiefly showing itself in deformities of bone, particularly of shafts of the long bones. It usually begins between the ages of six months and two years. The legs, particularly the shin-bones, are apt to become bowed, and the arms bent. The spine also may become distorted, and the bones of the skull thicken, producing a marked squareness of head. The ribs are soft and readily bent, and tend to form a 'pigeon breast.' The essential cause of rickets is due



Richmond.

Left, Washington Monument and City Hall; Right, State Capitol.

piece; *Quintus Fixlein* (1796), which contains many reminiscences of his own life. Other works are *Hesperus* (1795), *Titan* (1800-3), and *Flegeljahre* (1804-5), in which he attempts, in his own way, what Goethe attempted in his *Wilhelm Meister*, to evolve the ideal man; *Das Kampanerthal* (1797), a fantastic conversation on the immortality of the soul; *Vorschule der Aesthetik* (1804); and *Levana oder Erziehungslehre* (1807), in which last he shows a loving devotion to childhood. Jean Paul's naïveté, his simplicity, and his kindly humor must account for his enormous popularity. His intimate and reverential love of nature is obvious in all his work, and is especially conspicuous in certain descriptive passages of great beauty. Jean Paul's complete works have been published in 60 vols. (1826-38), and in 13 vols., with biography by Gottschall (1868-78).

**Ricinus**, a genus of plants belonging to the

to faulty nutrition. Recovery is the rule, though severe skeletal deformities may persist. The chief treatment is dietetic, though sunlight and fresh air are exceedingly valuable. Medicinal treatment is confined almost wholly to cod liver oil and phosphorus.

**Riddle**, an obscure metaphorical description akin to parable or proverb, and depending on analogy. Enigma ('sense-riddle')—the oldest form—rebus, charade (word syllabically described), and acrostic are varieties. The riddling or oracles and bards has degenerated into the conundrum-puns.

**Rideau Canal**, Ont., Canada, connecting Kingston, on L. Ontario, with Ottawa by way of the Rideau R. From Kingston to L. Rideau, the canal is formed by the Cataragui R. L. Rideau is the summit level of the canal, which joins the Rideau R. below the Chaudiere Falls.

**Ridge**, in geography, is used for any land

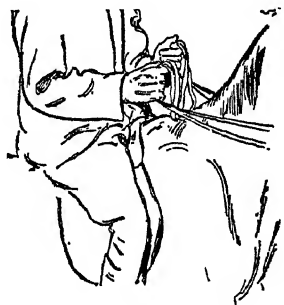
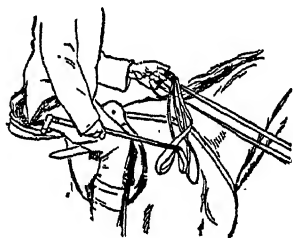
form which rises to a maximum line or crest. It should be employed in the singular for a single land form, and distinguished from a range, which may consist of more than one ridge.

**Ridgeway, Robert** (1850-1929), American ornithologist, born in Mt. Carmel, Ill. In 1883 he was one of the principal founders of the American Ornithologist Union. In 1880 he became curator of the ornithological department of the U. S. Natural History Museum, Washington, D. C. He has published: *A History of North American Birds* (3 vols. 1874); *The Birds of North and Middle America* (1901, sqq.), etc.

**Riding**, properly *thriving*—i.e. the 'third part'—the name of the three divisions of Yorkshire, England.

**Riding.** There are probably as many different 'correct' ways of riding as there are teachers. All agree, however, that the first thing to learn is the mount. The rider may, standing on the near side of the horse, either take the reins in his right hand and with it clasp the pommel of the saddle, insert the left foot in the stirrup, spring from the ball of the right foot, and, seizing a lock of the mane, steady himself until he carries his right leg over the croup and so sink into the saddle; or, facing to the rear, he may take the reins in his left hand and with it seize a lock of the mane; then, inserting his left foot in the stirrup, spring from the right foot and as he rises take hold of the pommel of the saddle, carry his right leg over the back of the horse, and when he has found his seat, transfer the reins to his right hand. In dismounting with the stirrup the rider should first release his right foot; then transferring the reins to his right hand he should with it seize the pommel, and with his left hand take a lock of the mane; then, taking his weight upon his left foot, supported by his hands he should carry his right leg over the croup, face the horse and come gently to the ground on his right foot, finally releasing his left foot and his holds upon the mane and pommel. Then comes the acquirement of a stable seat, and the man may find his own best seat in the following manner: Mounting the horse he should sit down in the saddle, taking his weight upon his buttocks while he holds his body erect, the shoulders held back squarely. He should then, raise his legs upward and inward until the points of his knees meet above the crest of the horse. From this position he will drop his legs slowly until the inner sides of his thighs and the flat inner surfaces of his bent

knees take every possible point of contact with the saddle, the lower parts of the legs hanging without stiffness. The length of the stirrup leathers will be right when the tread of the iron strikes the heels. The rider having learned the proper seat, he will take his posi-



*Correct Positions in Riding.*

Top, Mounting; Center, Reins in one hand; Lower, Reins in both hands.

tion upon the horse with a snaffle rein in each hand, the loose ends toward the thumbs and held by them, the reins passing through the breadth of his hands, which are held knuckles up, close together, to assist each other, and take a gentle feeling upon the mouth of the horse.

On the trot the rider must get into the swing of the horse, and learn to rise gracefully in the saddle to meet the rise of the horse's back, without bumping or permitting too much daylight between himself and the saddle. The army seat in the trot is without rising, and the horse and the rider are one. The stirrups must be longer for this. In the gallop, give the horse perfect freedom with his head, or he may stumble. In jumping, give him a long rein, for on landing he needs his head to recover himself. See FOX HUNTING; BRIDLE; SADDLE.

**Ridley, Nicholas** (?1500-55), English reformer, bishop of London, and martyr, son of a Northumberland squire. He received the vicarage of Soham, Cambridgeshire, and was created bishop of Rochester (1547). A leader of the reformed faith, Ridley assisted in compiling the English Prayer Book (1548) and reforming the ecclesiastical law; and on Bonner's deprivation succeeded him as bishop of London (1550). On the accession of Mary he was arrested (March, 1554); was sent to Oxford, with Latimer and Cranmer, to be tried; and was condemned to suffer at the stake. He lay in Bocardo jail at Oxford for eighteen months; and after the formality of a second trial he was burned at the stake (1555), along with Latimer. Consult G. Ridley's *Life*.

**Riel, Louis** (1844-85), Canadian insurgent, was educated at the Jesuit College, Montreal and then worked for two years in Minnesota. His father, a Métis or French-Indian half-breed, in 1849 headed their revolt against the Hudson's Bay Company, which owned the Northwest. In 1869 the Company sold its political rights to the Dominion of Canada, which sent a host of surveyors and officials to take possession, without guarantee or explanation to the old residents. The Métis rose, ordered the party not to enter, armed several hundred men, and barricaded the road. Riel took the lead, as secretary of a 'Comité National des Métis'; moved his force, into the heavily armed and stocked Fort Garry; and thence terrorized the non-French settlers who refused to join. He styled himself 'president of the Republic of the Northwest,' and had a Bill of Rights drawn up, claiming for the Métis a share of the payment made to the company.

The Dominion Parliament, though victorious, embodied this in its Manitoba Act, but Riel outlawed his part in it by the judicial murder of an Ontario Orangeman, Thomas Scott, who stood out. When, the next summer,

Col. Garnet Wolseley led an expedition against Riel, the latter's force had all deserted. In 1884 he was invited back to lead a fresh Métis agitation. The claims being refused, he again set up a provisional government (March, 1885), which was soon crushed; and he was taken to Regina, tried, and executed.

**Riemann, Georg Friedrich Bernhard** (1826-66), German mathematician, was born in Breselenz. He contributed to mathematics a non-Euclidean system of geometry, and introduced new and valuable theories in connection with the study of functions and surfaces. His works include: *Grundlagen für Allgemeine Theorie der Funktionen einer Veränderlichen Complexen Grösse* (1851); *Ueber die Hypothesen, Welche der Geometrie zu Grunde Liegen* (posthumously, 1867). Consult Schering's *Life*, in German.

**Rienzi, Cola di** (i.e., Nicholas son of Lorenzo) (c. 1313-54), Roman popular leader, was the son of a tavern keeper. Growing famed for eloquence and patriotic dreams, in 1343 he was made spokesman of a deputation to Clement vi., urging his return to Rome, and the grant of a jubilee to bring crowds and money. The latter was secured, and Rienzi was appointed city notary. As the magistrates would reform nothing, he with the Pope's vicar organized a revolution, proclaiming a set of new laws, making himself supreme ruler as Tribune, and ordering the barons to put down brigandage. Resisting him, the latter were either driven out or forced to obey, thus giving Central Italy its only good government for ages before and after. Then a mad vision for his city, a foolish attempt to crush his foes, and family ambition combined to ruin him. He lost heart and resigned, after seven months' rule.

Innocent vi., on his accession, sent Rienzi back to Rome to help restore order. He was asked by the chief men to retake power, but the populace rose in sudden insurrection, stormed the palace, and in fleeing he was caught and slain. Rienzi's story rests chiefly on one anonymous but sound and charming contemporary chronicle, and on Petrarch's letters. He is the subject of a novel by Lord Lytton, and of an opera by Wagner.

**Riesengebirge**, the highest range of the Sudetic Mountains, Germany, separating Bohemia from Prussian Silesia, and stretching n.w. to s.e. for 23 m., and from 13 to 16 m. wide. The highest point is Schneekoppe (5,265 ft.).

**Rietschel, Ernst** (1804-61), German sculptor, was born in Pulsnitz, Saxony. From

1832 until his death he was professor of sculpture at the Dresden Academy. Among his works are *Pietà* (Potsdam, c. 1847); *Emblematic Sculptures* (Dresden, 1852 et seq.); Goethe-Schiller Monument (Weimar, 1857); Rauch (1857), and Weber (Dresden, 1860).

**Rievaulx Abbey**, or **Rivaulx**, in North Riding, Yorkshire, England; 22 m. n. of York. It was founded in 1131 for the Cistercians. It now consists of ruins of the choir, transepts, refectory, and dormitory.

**Rif, Riff**, or **Er Rif**, a coast range of hills in Northern Morocco, near the Mediterranean, 180 m. in length. The general elevation is about 2,000 ft., and the greatest altitude about 7,000 ft. The name is given also to the district. The inhabitants are Berbers, who were formerly much addicted to piracy.

**Rifle**, a firearm the barrel of which has spiral grooves throughout its inner surface or bore. As commonly used, the word refers to rifled small arms fired from the hand, but it is applied sometimes to direct fire cannon of all calibres. The projectile, forced along the barrel by the explosion of the powder charge, follows the grooves of the rifling, and acquires a motion of rotation about its long axis, which rotation it retains during flight through the air. At the time of its invention, the only successful small arms were muzzle loaders, so naturally the first successful rifle was a muzzle loader. The date of the discovery of the principle of rifling is not known to a certainty. Some authorities state that it was between 1470 and 1500.

In Europe little important improvement was made until the beginning of the 19th century. In America, development was more rapid, and the improvements were more practical; so that even before the Revolutionary War the rifle was in general use by frontiersmen. Meanwhile the Brunswick rifle, having two grooves, and firing a spherical bullet with a projecting ring around it to take the rifling, made its appearance. The Lancaster rifle was introduced into the British service at about the same time as the Enfield. Instead of grooves it had a smooth, spiral, elliptical bore of increasing twist. The next great change in military rifles was the adoption of the breech loader. In 1812 Pauly, a Frenchman, evolved a breech-loading rifle with a swinging block; and Dreyse, working under him, developed the first needle-gun bolt action in 1839. Dreyse's bolt action was modified and adopted by the Prussians; and the success of the Prussians in the Danish and Austrian wars caused all nations to adopt

breech loaders. The U. S. in 1873 adopted the Springfield. A few years before World War II it adopted the Garand (M-1), a .30-caliber semi-automatic shoulder rifle.

The next great departure in the military rifle was the introduction of the magazine. The repeating firearm was brought out in America by Colt in 1840, followed in 1860 by the Henry and Spencer rifles. In 1867 the Henry was improved and re-named the Winchester. Magazines may be grouped in two general classes: the tubular, in which the cartridges are contained in a tube under the barrel; and the box, in which the cartridges lie above or alongside one another in a small metal box under the breech mechanism.

Rifles that have tubular magazines are generally called repeating rifles, and those that have box type magazines, magazine rifles. In the United States, after an exhaustive test, the Krag-Jørgensen rifle was adopted in 1892, superseding the Springfield single loader; and in 1902 the Krag-Jørgensen was superseded by the Springfield magazine rifle, which was modified in 1903. This is a bolt action rifle with a vertical box magazine filled by means of a clip holding five cartridges. The natural successors of the repeating and magazine rifle are the automatic and semi-automatic rifles. The term 'automatic' means that the weapon continues to fire as long as the trigger is pressed, until the magazine or the belt of ammunition is empty. The term 'semi-automatic' means that the firer must press the trigger for each shot. Automatic and semi-automatic rifles fall into three classes: gas-operated, recoil-operated, and blow-back.

Machine guns are classified as water-cooled and air-cooled. The air-cooled type of machine gun has a heavier barrel than the water-cooled type, and the entire weapon is lighter, but its period of sustained fire is materially shorter on account of over-heating of the barrel. Only air-cooled types of machine guns are used on aircraft. The machine rifle is a modified automatic rifle. It has a heavier barrel than the automatic, which gives it a longer period of sustained fire. It is usually supported by a light bipod, somewhat heavier than the automatic rifle, and, in the same manner as the latter, is provided with means for obtaining either automatic or semi-automatic fire. Ammunition for use in automatic and machine rifles is packed in magazines of from 20 to 40 rounds capacity.

The production of the rifle is a complicated

process. In the manufacture of firearms, especially if they are of a military type, it is absolutely essential that every one of each part shall be as nearly identical as possible with the others of the same kind. This provides for interchangeable parts, prevents waste, and permits greater and more economical production. See FIREARMS; GUNS; SHOOTING; AMMUNITION; BULLET; TARGET.

**Riflebird, or Rifleman** (*Ptilhoris paradiseus*), a bird of paradise found in North-

has many manufacturing establishments. The chief exports are flax, hemp, timber, butter, eggs, grain, hides and skins. Industries include machine works, breweries, distilleries, saw mills, and oil mills.

Riga was founded in 1201 by Bishop Albert I. of Livonia, and was settled largely by Germans. It was taken by Sigismund II. of Poland in 1547, by Gustavus Adolphus of Sweden in 1621, and by Peter the Great of Russia in 1710. During the Great War of Europe, Riga became the objective of a



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*Browning Automatic Rifle.*

(It may also be fired from the shoulder.)

ern Australia and New Guinea. It is a handsome bird, between 11 and 12 in. in length, with a long, curved beak.

**Riga**, capital and chief town of the republic of Latvia, situated on the Dvina River, 9 m. from its mouth in the Gulf of Riga. In the old town, which still preserves the aspect of a mediæval city, are the Town Hall, dating from 1750; the house of the Black Heads of Riga, founded in 1330 as a club of foreign merchants; the Domkirche, or St. Mary's Cathedral, originally built in 1215, rebuilt in the 16th century, and restored since 1880. Educational institutions include Latvian University, and City College.

Riga is the industrial center of Latvia and

number of attacks by the German land and sea forces. In 1917 the Russians evacuated the town and German warships entered the Gulf of Riga. Latvian independence lasted from 1918 to 1940; p. 393,000.

**Rigadoon**, a lively dance with a jumping step, danced to music written in  $\frac{3}{4}$  or common time. It was popular in France during the 17th century, and was subsequently introduced into England.

**Riga, Gulf of, or Gulf of Livonia**, an inlet on the e. side of the Baltic Sea, which washes the shores of Livonia and Estonia. It is 100 m. in length from n. to s., and about 80 m. in breadth.

**Rigel** (*B* Orionis), a helium star of 0.3

magnitude, the *lucida* of the constellation Orion. It has no measurable parallax, and must give at least 8,000 times the light of the sun.

**Rigging**, in current use, the cordage which supports and manages the sails of a vessel, and correctly so if used of a mast or yard; but more accurately, the entire body of apparatus accessory to the hull—masts, yards, sails, cordage, and even davits. See **SAILS** and **RIGGING**.

**Riggs, Stephen Return** (1812-83), American missionary, was born in Steubenville, O. From 1837 until his death he was a Presbyterian missionary among the Dakotas, Sioux, and other Indian tribes. His publications include *Dakota Vocabulary* (1852); *The Bible in Dakota* (with John P. Williamson, 1879); *Forty Years among the Sioux* (1880).

**Riggs' Disease**. See **Pyorrhœa**.

**Right Ascension**, in astronomy, the name given to one of the arcs which determine the position, relatively to the Equator, of a heavenly body on the celestial sphere, the other being the *declination*. It meant originally the difference of time of rising of the first point of Aries. Its value for any heavenly body is ascertained by means of the transit instrument and clock, and is usually measured in hours, minutes, and seconds.

**Right-handedness**, or the ability to use the right hand more easily than the left, is explained as due both to gradually acquired habit, and to certain structural and functional peculiarities of the human body. Left-handedness is largely hereditary, and exists in varying degrees. Ambidexterity, or the ability to use both hands with equal facility, is sometimes cultivated, especially in children with a slight tendency to left-handedness.

**Right of Search**. See **Search, Right of**.

**Right of Way**, the name given to an easement or privilege enjoyed by individuals or classes of individuals, or by the public at large, of passing over the private property of another without being guilty of trespass. See **EASEMENT**; **HIGHWAY**.

**Rights, Bill of**. See **Bill of Rights**.

**Rights of Man, Declaration of the**, a famous statement of the constitution and principles of civil society and government adopted by the French National Assembly in August, 1789. In historical importance it may fairly be ranked with the English Bill of Rights and the American Declaration of Independence.

**Right Whale**, either of two species of whale belonging to the genus *Balæna*, whose

whalebone is especially long and fine, and the oil abundant and of excellent quality. The right whales are further characterized by absence of the dorsal fin and of furrows at the side of the throat and by the great size of the head and mouth.

**Rigi**, or **Righi**, an isolated mountain mass which rises east of the Swiss town of Lucerne, between the Lakes of Lucerne and Zug. The highest point, the Rigi Kulm (5,906 ft.) is crowned by a hotel. The view from the Rigi is one of the most famous in the world.

**Rigidity**, is one of the properties of matter which sharply differentiate solids from fluids. In abstract dynamics a rigid system is a collocation of particles which never alter their mutual relative positions. Of ordinary substances, steel possesses the highest rigidity. See **ELASTICITY**; **STRENGTH OF MATERIALS**.

**Rigor**, in medicine, the shivering or chill which commonly ushers in certain feverish conditions that attend such diseases as small-pox, pneumonia, and pyæmia.

**Rigorists**, in theology, those who advocate strict adherence to the letter of any moral law. Kant used it to mean champions of moral asceticism.

**Rigor Mortis**, the rigidity which appears in a dead body, and which is due to the coagulation of muscle plasma—i.e., the contents of muscle fibres. Generally, rigor mortis affects the whole body in from 12 to 18 hours after death, and passes off in about 36 hours.

**Rigsdag**, the parliament of Denmark. See **DENMARK**.

**Rig-Veda**, the oldest and most important of the Vedas, consists of a collection of hymns addressed to the powers and phenomena of nature. It dates between 1500 and 1000 B.C. See **VEDAS**.

**Riis, Jacob August** (1849-1914), American author and social reformer, was born in Ribe, Denmark. He came to America in 1870, and in 1877 joined the staff of the *New York Tribune*, and later that of the *New York Sun*. He became active in philanthropic movements in New York City, especially the improvement of the condition of the poor, tenement-house reform, the provision of playgrounds and small parks, and the suppression of the sweatshop system. His publications include: *How the Other Half Lives* (1890); *The Making of an American* (1901); *The Battle with the Slum* (1902); *Children of the Tenements* (1903); *Theodore Roosevelt, the Citizen* (1904); *Neighbors* (1914).

**Riker, Andrew L.** (1868-1930), American



engineer, was born in New York City, and was graduated from Columbia Law School. He produced one of the first electrically propelled vehicles in the United States, and was a successful designer of gas engines, dynamos, motors, electric systems, transformers, and automobile parts.

**Riley, James Whitcomb** (1853-1916), American poet, born in Greenfield, Ind., son of a leading attorney of that place. In 1873 he began contributing verse to the Indiana papers. He made a study of the 'Hoosier' dialect; his poems in that vernacular were widely popular, and obtained him entrance to the magazines. His first collection, *The Old Swimmint' Hole, and 'Leven More Pieces* (1883), was published over the pen name of 'Benj. F. Johnson, of Boone'—a little book much valued by collectors.

The combination of humor, pathos, and sentiment in James W. Riley's verse appealed to high and low alike. He became known as 'the Hoosier Poet'; but many of his most poetic pieces are written in ordinary English, such as 'When She Comes Home,' 'Ike Walton's Prayer,' and 'Dwainie.' Of late years it has been increasingly recognized that he is of high permanent significance in American literature, not only for individual pieces, but as a creator of types. James W. Riley's works include: *The Boss Girl, and Other Sketches* (1886); *Rhymes of Childhood* (1890); *A Child World* (1896); *Raggedy Man* (1907); *The Little Orphant Annie Book* (1908); *Old School Day Romances* (1909); *When the Frost Is On the Punkin, and Other Poems* (1911); *The Riley Baby Book* (1913). The Biographical Edition of his Complete Works was published in 1913.

**Rime.** See **Hoarfrost; Rhyme.**

**Rimini**, town, Italy, in the province of Forlì, near the Adriatic coast, 31 m. s.e. of Ravenna. It has a good harbor on the canalized river Marecchia and is a favorite seaside resort. Features of interest are the church of St. Francesco, now the cathedral, which was built in the 14th century, and the municipal buildings, containing a famous collection of paintings. Among Roman antiquities is the Porta Romana, a triumphal arch, and a well preserved marble bridge across the Marecchia. The Palazzo Ruffo was the scene of the murder (1285) of Francesca da Rimini, immortalized by Dante. The principal trade is in silks and sulphur. Rimini, the ancient Ariminum, was made a bishopric in 260, and a celebrated council of Arians and Athanasians

was held here in 359. It was ceded to Venice (1503); p. 29,545.

**Rimini, Francesca da.** See **Francesca.**

**Rimmer, William** (1816-79), American sculptor and teacher, was born in Liverpool, England, and educated in London. He lectured at Harvard University on art anatomy, upon which he was an acknowledged authority. For several years (1866-70) he was director of the art school of the Cooper Union in New York City. His work includes *The Falling Gladiator*, now in Boston, of which a replica has been made for the New York Metropolitan Museum, a colossal head of St. Stephen, and a statue of Alexander Hamilton. He published *The Elements of Design*.

**Rimsky-Korsakoff, Nicolas Andreivitch** (1844-1908), Russian composer, was born in Tekhvin. His first symphony was written in 1865 and his first opera in 1872. He was professor of instrumentation in the Petrograd Conservatory (1871), head of the Free School of Music (1872-81), and conductor of the Balaief Symphony Concerts (1886-1900). His influence was widely felt, especially among Russian musicians. His published works include *The Maid of Pskof* (1872); *The Snow Maiden* (1881); *Sadko* (1896); *The Tsar's Bride* (1898); *The Golden Cockerel* (1907), besides many songs, three symphonies, and a small amount of chamber music.

**Rinehart, Mary Roberts** (1876- ), American author and playwright, was born in Pittsburgh. Her publications which have enjoyed great popularity, include *The Circular Staircase* (1908); *Tish* (1916); *The Amazing Interlude* (1917); *Lost Ecstasy* (1927). *The State versus Elinor Norton* (1934), and several plays, in some of which she has collaborated with Avery Hopwood.

**Ring**, a band of metal used to adorn the finger. From the earliest times great importance and even sanctity has attached to the ring or circle. The wearing of a ring has been held to prevent the entrance of evil spirits into the body of the wearer. Or, again, the ring may be held to symbolize eternity, without beginning or end. In traditional lore, rings are frequently endowed with supernatural power. At the present day the efficacy of the finger-ring is still greatly believed in, and many civilized people would not regard themselves as married if a ring did not figure in the wedding ceremony. The duplex *jimmal* ring was a symbol of true love, being constructed of twin or double hoops, which

fitted into each other and formed one. Consult Jones' *Finger-ring Lore*.

**Ring Dove, Wood Pigeon, or Cushat** (*Columba palumbus*), a wild pigeon of Western Europe, so called on account of the white feathers which partly encircle the neck; there is also a white band on the wings, and the tail feathers are nearly black.

**Ringed Plover, or Ringneck** (*Æ hiaticula*), the popular name for any member of the genus *Ægialitis*, one of whose distinguishing marks is a dark line or band around the neck. See PLOVER.



James Whitcomb Riley.

**Ring Money**, a medium of exchange used in early commerce, before the invention of coinage, but after the inconveniences of direct barter became evident. Precious metals were made into the form of rings and were used as currency in this form among the early Egyptians. Cæsar mentions that in Gaul and Britain gold and silver rings were used as money.

**Ring-Ouzel** (*Turdus torquatus*), a thrush which breeds in mountainous regions throughout Europe, eastward as far as the Urals.

**Ring Snake**, a popular name in different countries for several distinct species of snake. In the United States it is a small harmless snake of the Southern States, bluish black in color, with a whitish collar band.

**Ringworm**, a parasitic skin disease, highly contagious, and due to either of two parasitic fungi, *Microsporon andouini* or a variety of *Trichophyton*. It affects cattle, horses, sheep, dogs, guinea-pigs, and cats, and may be communicated to man from any of these. When found on the surface of the body the fungus grows in the epidermis; but on the scalp, where it is most common, it is chiefly seated in the interior of the hair roots. The

term *Porriga* is often used for this disease, although it designates also other diseases of the scalp.

**Riobamba, or Cajabamba**, town, Ecuador, capital of Chimborazo province, near the Riobamba River; 85 m. n.e. of Guayaquil, at an altitude of 9,000 ft. It is the residence of a bishop, and contains a cathedral, a seminary, and a national college; p. 20,000.

**Rio Colorado**, a river of the Argentine Republic, rises in the Andes, under the name of Rio Grande, and after a generally s.e. course for about 500 m. as the Rio Colorado, enters the Atlantic Ocean through Bahia Blanca.

**Rio Cuarto**, town, Argentine Republic, in Cordoba province; 170 m. s. of Cordoba. It is a place of strategical importance. The leading industries are flour milling, breweries and tanneries; p. 18,000.

**Rio de Janeiro**, state, Brazil, on the east coast, bounded by the states of Esperito Santos, Minas Geraes, and São Paulo, and by the Atlantic Ocean; area, 26,634 sq. m. The climate is delightful and the soil generally fertile. The inland portion is mountainous, while the land along the coast is low. The principal river is the Parahyba do Sul. The chief minerals are iron, kaolin, and marble and the chief agricultural products are coffee, cotton, rice, sugar, tobacco, fruit, rubber, and cattle. The capital is Nictheroy (p. 108,000); p. 2,000,000.

**Rio de Janeiro**, city, capital of Brazil, and second largest city of South America, is situated in a Federal District (area, 431 sq. m.), bounded by the Atlantic Ocean, the state of Rio de Janeiro, and the bay of the same name. The bay gradually widens from  $\frac{3}{4}$  m. at the entrance to 15 m. at the head, 16 m. inland. The city is defended by forts on either side of the harbor entrance. The climate is healthy, though hot for about two months of the year. Rio de Janeiro is divided into sections by many ridges, the most famous heights being Sugar Loaf (Pão de Azucar, 1,260 ft.) and Corcovado (2,300 ft.); but the sections are connected by broad avenues. The commercial section and the poorer quarters are built on the flat land. The capital has several fine parks and squares, as well as Botanical and Zoological Gardens.

The educational institutions of the city include the National Library containing many valuable collections, the University formed in 1920 by the consolidation of the Medical, Polytechnic, and Law Schools, Municipal Library, Observatory, Botanical Garden, His-

torical and Geographical Institute, National School of Music, National School of Fine Arts, Superior School of Agriculture, and Military Aviation School. The industrial establishments include flour mills, foundries, breweries, sugar refineries, shoe, textile, and printing works.

**Commerce.**—Rio de Janeiro is the first commercial city of Brazil, and the second of South America. The principal exports are coffee, rubber, sugar, hides, ores, and diamonds.

**Population.**—In 1940 the population of Rio de Janeiro was 1,711,000. The bay of Rio de Janeiro is said to have been discovered on

America, rises in the San Juan Mountains, in Southwestern Colorado, out of which it flows to the San Luis Valley, thence, hemmed in between canyon walls, s. across New Mexico. Below El Paso, Texas, it becomes the boundary line between the United States and Mexico, pursuing a general southeasterly course of about 2,000 m. to the Gulf of Mexico. During part of the year it is nearly if not quite dry when it enters Texas. The chief towns on its banks are Brownsville, Matamoros (Mex.), Laredo, Eagle Pass, Presidio, and El Paso. The Pecos is its principal tributary.

**Rio Grande,** river of Brazil, one of the



*Rio de Janeiro: Municipal Theatre.*

Jan. 1, 1502, by Gonzalo Coelho. In 1531 one Martim Affonso de Sousa sailed into the harbor and thinking it an estuary, called it the River of January. From 1531 to 1567 the French made several attempts to settle, but were driven out by the Portuguese, who made a permanent settlement in 1567. The city became the capital of Brazil in 1762. Upon the overthrow of the monarchy, in 1889, the city was made the capital of the Republic.

**Rio de Oro** and **Adrar**, Spanish colony in West Africa, extending from Cape Bojador, in Southwest Morocco, 400 m. along the Atlantic Coast, to Cape Blanco in the s.; area, about 109,000 sq. m. Fishing is the leading industry; p. 100,000, mostly Berbers.

**Rio Grande** (**Rio Grande del Norte**, **Rio Bravo del Norte**), a large river of

chief affluents of the Paraná. It flows westward in a course of about 450 m., joining the Paranahyba to form the Paraná.

**Rio Grande**, town and seaport, Brazil, in the province Rio Grande do Sul, at the entrance to Lagoa dos Patos. It is the second port in the state; p. 47,600.

**Rio Grande de Cagayan**, the largest river of Luzon, Philippine Islands, rises in the center of the island, and flows for 250 m. to the Pacific at Linso.

**Rio Grande de Mindanao**, or **Pulangui**, the longest and largest river of the Philippine Archipelago. It rises in the n. of Mindanao, and flows s. and then w. for 200 m. to Illana Bay at Cotabato.

**Rio Grande do Norte**, state, Brazil, on the n.e. coast, bounded by Ceara, Parahyba, and the Atlantic Ocean; area, 20,236 sq. m.

The chief products are sugar cane, cotton, cereals, salt, and cattle. Cattle raising is the leading industry. Natal is the capital and chief city; p. 738,000.

**Rio Grande do Sul**, state, Brazil, on the s.e. coast, bounded by Santa Catharina, Argentine, Uruguay, and the Atlantic Ocean; area, 106,289 sq. m. It lies wholly within the temperate zone and has a maritime temperate climate. The Serra Geral range divides the state into two unequal portions. The agricultural products include coffee, sugar, fruits, corn, rice, tobacco, wheat, and cotton. Cattle and horse raising is also profitable. Meat packing is the most important industry. There are many German and Italian colonists. Porto Alegre (p. 273,376) is the capital; p. 3,000,000.

**Rio Negro**, a territory of the Argentine Republic, forming part of Patagonia; area, 77,000 sq. m. The climate is good and the soil generally fertile. Stock raising is the leading industry and corn, wheat, alfalfa and barley are grown. The capital is Viedma; p. about 50,000.

**Rio Negro**, a western department of Uruguay; area, 3,270 sq. m. The capital is Fray Bentos (Mercedes), 160 m. n.w. of Montevideo; p. 20,000.

**Rios**, or **Los Rios**, an inland province of Ecuador. It is flat and crossed by many rivers, and the industries are cattle raising and the production of cacao. The capital is Babahoyo, 45 m. n.e. of Guayaquil; p. 42,000.

**Riot**, a tumultuous disturbance of the public peace by three or more persons assembled for some purpose, with the common intention of carrying out their designs in a violent and turbulent manner if necessary. By statute in some States riot is more severely punished if the intention is to resist the enforcement of a statute of the State or of the United States, or if the offender carries arms; if the act is directed against the government, it is known as treason.

**Rio Tinto**, town, Spain, in the province of Huelva, 50 m. n.e. of its port, Huelva. Copper mines, which were worked in Phœnician and Roman times, still yield a large supply of the metal; p. 14,000.

**Riouw-Lingga**, two archipelagoes, Dutch East Indies, lying s. and s.e. of Singapore, the Lingga group on the equator. With the smaller archipelagoes between Borneo and the Malay Peninsula, they have an area of 17,231 sq. m., and a population of 225,000, more than one-fifth Chinese. The natives of Lingga collect trepang and the seaweed agar-

agar. Pepper, gambier, and tin are exported. The island of Riouw was formerly known as Bintang.

**R.I.P.** (*Requiescat in pace*), 'May he (or she) rest in peace.'

**Riparian Owners.** See **River**.

**Riparian Rights**, the rights of owners of land immediately adjoining or bounded by a river or stream, or through which one flows, to its bed, banks, and waters. These rights are incidental to the ownership of the land. A riparian owner is entitled to make reasonable use of the water for agricultural, domestic, and manufacturing purposes. What is a reasonable use must be determined in view of the rule that all riparian proprietors on the stream have corresponding rights, and can object if the flow of water is seriously diminished, or its quality impaired by pollution. A riparian owner cannot divert the course of a stream, nor change the current so as to wear away his neighbor's land, but may protect his land from the action of the water. See **ACCRETION**; **RIVER**.

**Ripley, George** (1802-80), American scholar, was born in Greenfield, Mass. He was an ardent disciple of the principles of Unitarianism, which was then at the height of its influence in New England. In 1840, with Emerson and Margaret Fuller, he founded *The Dial*, in Boston, and was its resident editor until the next year, when he relinquished that position to found Brook Farm. For this community he edited *The Harbinger*, which became the leading organ of Fourierism in the United States. In 1849 he became connected with the New York *Tribune* as literary critic, and in this position and as general contributor, he remained for 31 years. For nearly the same period he was also reader for *Harper's Magazine*. He exerted a wide and wholesome influence on the literary men of his day.

**Ripley, James Wolfe** (1794-1870), American soldier, was born in Windsor, Conn.

**Ripley, William Zebina** (1867-1941), American economist, was born in Medford, Mass. He was professor of economics in the Massachusetts Institute of Technology in 1895-1901, when he accepted a similar position at Harvard University. In 1918 he was appointed administrator of labor standards for the War Department and in 1920-23 was special examiner for the consolidation of railroads for the Interstate Commerce Commission. He is the author of *Trusts, Pools, and Corporations* (1905); *Main Street and Wall Street* (1927), etc.

**Ripon**, cathedral city, England, in West Riding, Yorkshire; 26 m. n. of Leeds. The cathedral, chiefly 12th and 13th centuries, replaced a 7th-century church, the crypt of which still remains. The celebrated ruins of Fountains Abbey are in the vicinity; p. 8,576.

**Ripon, George Frederick Samuel Robinson**, First Marquis of (1827-1909), British statesman, was born in London. In Gladstone's first government (1868-74) he filled the office of Lord President of the Council, and was chairman of the British Commission appointed in 1871 to settle with the United States regarding the *Alabama* and similar claims, which resulted in the Treaty of Washington. For this he was created Marquis of Ripon. He became viceroy of India (1880) being the first Roman Catholic to hold vice-regal office. In Gladstone's third administration (January to July, 1886) the Marquis of Ripon filled the post of First Lord of the Admiralty, that of Secretary of State for the Colonies (1892-5), and in Sir Henry Campbell-Bannerman's ministry (1905-8) that of Lord Privy Seal.

**Rip Van Winkle**, the title character of a story in Irving's *Sketch Book* (1819). The character was made famous by the actor Joseph Jefferson.

**Rise**, the term for a submarine elevation which rises gradually with an angle of only a few minutes of arc, irrespective of whether it is wide or narrow, or of its vertical development.

**Rishis**, the seven (sometimes given as ten) sons of Brahma, to whom the *Vedas* were first communicated, and who became the missionaries to mankind.

**Ritornello**, in music, a short instrumental composition which is sometimes introduced to fill the interval between the scenes of an opera. The name is also given to the instrumental symphonies performed between the verses or phrases of songs or anthems.

**Ritschl, Albrecht** (1822-89), German theologian, was born in Berlin. In 1846 he became a lecturer at Bonn, full professor in 1859, and was transferred in 1864 to Göttingen, where he worked till his death. In 1870 he published *Die Christliche Lehre der Rechtfertigung und Versöhnung*. In this work, really a system of theology, Ritschl develops the now famous distinction between theoretic judgments and value judgments, and maintains that theology has erred in building upon the former, which, while all-important in science, are inadequate to the expression of spiritual truth.

**Rittenhouse, David** (1732-96), American astronomer, born in Roxborough, Pa. In 1769 he surveyed the boundary between N. Y. and N. J. and a portion of Mason and Dixon's line. In the same year he made observations on the transit of Venus from which the first approximate measurements of the spheres were calculated. President Washington appointed him director of the U. S. Mint in 1792-5. He invented several astronomical instruments, and acquired great skill in clock-making.

**Ritter, Frederic Louis** (1834-91), American composer, teacher, and author, born in Strassburg. In 1856 he settled in Cincinnati, O., where he organized the Cecilia Society and the Philharmonic Society. In 1861 he became conductor of the Arion (New York) Society's music, and in 1874 was appointed professor of music at Vassar College. He composed five symphonies and more than one hundred songs.

**Ritual**, or **Rituale**, an ecclesiastical manual in which are to be found the order and rites of divine service. The ritual of the Church of England is contained in the Book of Common Prayer with its rubrics. The Roman ritual is divided into the breviary, the missal, the ritual, and the pontifical. The ritual contains those offices which may be administered by a priest, while the pontifical deals with those which can only be performed by a bishop.

**Ritualists**, a name adopted by those who, at the commencement of the Oxford Movement, devoted themselves to the task of procuring an exact and intelligent following of the rubrics of the Book of Common Prayer. They were then led to study the whole ritual system of the Catholic Church, and many of them adopted rites and ceremonies for which no direct authority could be found in the Anglican prayer-book, and some of which have been forbidden by decisions of ecclesiastical courts. In 1874 the General Convention of the Protestant Episcopal Church attempted to legislate against alleged ritualistic practices.

**River**, a mass of water moving down a definite channel from a higher to a lower elevation. The speed of a river increases with its slope and volume. The average descent of most great rivers is small—the Volga and the lower Mississippi, 3 in. per m. (about one in 20,000). The Missouri has a comparatively rapid descent for such a large river—about 28 in. per m. (about one in 2,250).

Some parts of a river's course are areas of

erosion, others of deposition, and many are alternately the one and the other, with flooding and shrinking. In law, a river is considered to be a stream of water larger in volume than a creek or brook, flowing in one direction constantly, or up and down with the tide, and discharging into a larger body of water. In general, the public possesses the right to navigate rivers capable of navigation. But in the U. S. legislation affecting navigation, as well as the improvement of navigable rivers, is vested in Congress, or, in lieu of Congressional action, in the state legislatures.

**Rivera, Diego** (1886- ), artist, was born in Guanajuato, Mexico, of an intellectual family of liberal views. He studied art in Mexico, Spain, and France where he came under the influence of the political teachings of Russian exiles. He was highly affected by the work of Cézanne, and became the friend and student of Picasso. After a trip to Italy in 1920, he began to think and plan in terms of murals. Rivera and the Mexican painter Orozco are now painting the true fresco, a difficult art. Rivera's work commissioned for Rockefeller Center was destroyed, owing to his refusal to substitute another for the likeness of Lenin, but examples of his work may be seen in New York City, Detroit, San Francisco, and government buildings in Mexico. His frescoes, by their radical subjects, have provoked bitter criticism, as well as the highest praise for their excellence as works of art.

**River Brethren** originated among some Swiss settlers in Pennsylvania, supposed to have been Mennonites. In consequence of a revival about 1770 a number of churches were organized, the first members receiving baptism in the Susquehanna, whence their name. About half of the total membership is in Pennsylvania. They practise trine immersion, washing of feet, non-resistance, and non-conformity to worldly practices.

**Riverside**, city, California. It is a residential city and is known for its beautiful tree-lined drives. Riverside is a shipping point for citrus and deciduous fruits, grain, dairy products, and poultry. An extensive trade is carried on in Portland cement which is manufactured here; p. 34,696.

**Rives, Alfred Landon** (1830-1903), American engineer, was born in Paris, France. He was one of the assistant engineers in charge of the construction of the Capitol at Washington, the Washington aqueduct, Potomac River improvements, and other Govern-

ment works. He was chief engineer of the Cape Cod Canal.

**Rives, Amélie (Princess Troubetzkoy)** (1863- ), American author and poet, was born in Richmond, Va. In 1888 appeared *The Quick or the Dead?* a novel which, because of its fervid style, attracted much attention and invited some ridicule. This was followed by *Virginia of Virginia* (1888); and other works including *As the Wind Blew*, poems (1920); *The Sea Woman's Cloak* (1923); *The Prince and the Pauper* (1920); *Love-in-a-Mist* (1926); *Firedamp* (1930).

**Rives, William Cabell** (1793-1868), American politician, was born in Nelson co., Va. Appointed minister to France by Jackson in 1829, he negotiated the indemnity treaty, signed July 4, 1831, and returned to America in 1832 to enter the U. S. Senate. He was again minister to France in 1849-53.

**Riviera**, a narrow strip of coast on the Gulf of Genoa, Italy, extending into France. Owing to its sheltered climate and the natural beauty of its scenery, the different towns along the coast—such as Pegli, San Remo, Ospedaletti, Bordighera, Mentone, Monte Carlo, Monaco, and Nice—are favorite health and pleasure resorts. Parallel with the coast runs La Corniche, a picturesque road built by the Romans, and widened by Napoleon I. in 1800.

**Rivière, Briton** (1840-1920), English animal painter of Huguenot descent, born in London. Six of his pictures are in the Tate Gallery, London; his *Sympathy* (1877) is in Holloway College. His masterpiece is *Persepolis* (1878).

**Rivington, James** (c. 1724-1802), American Loyalist journalist, born in London. From 1773 until his press was destroyed by a party of Connecticut militia in 1775, he published the *New York Gazetteer* in the Tory interest. Toward the close of the war, when American success seemed likely, Rivington began to furnish secret information to Washington, and on the British evacuation endeavored to continue his paper under the name of *Rivington's New York Gazette and Universal Advertiser*, but he was unpopular and his paper soon ceased publication.

**Rix, Julian Walbridge** (1850-1903), American landscape painter, born at Peacanam, Vt. *St. John's Harbor* (1903) is one of his best pictures.

**Rixey, Presley Marion** (1852-1928), American naval surgeon, born in Culpeper, Va.

**Rizal, José** (1861-96), Filipino author and

physician; born at Calamba, Luzon. He wrote *Noli me Tangere* (1886), a protest against the abuses he had observed in the rule of the civil government and friars over his countrymen. Its exposures gained him the ill will of the authorities, and he was obliged to fly to Japan in 1887. He passed some time in cities of the Continent, writing meanwhile a sequel to his first novel, entitled *El filibusterismo* (1891).

**Rizzio, or Riccio, David** (?1533-66), secretary to Mary, Queen of Scots, born at Pancalieri, near Turin, Italy. His haughty demeanor incensed the Scottish nobles, and a band of armed conspirators burst into the supper chamber at Holyrood Palace, Edinburgh, and dragging Rizzio from the queen's presence, stabbed him to death (1566).

**R.N.**, Royal (British) Navy.

**Roach**, a small fresh-water fish, common in Europe n. of the Alps, and related to the dace, with which it is often found.

**Roadrunner**, a ground-cuckoo found in the Southwestern U. S.; also called 'chaparral-cock,' 'snake-killer,' and 'paisano.' From tail to tail it measures nearly two feet.

**Roads**, a way of communication by land between various points. Most roads are designed chiefly for the use of vehicles. The earliest roads of history were the great highways for war and commerce, extending to districts not readily accessible by water. The Appian Way, which dates from 312 B.C., and extended 360 m. from Rome to Brundisium, was provided with deep and durable pavement. A notable example of Roman road in England is Watling Street. France seems to have been the first nation after the Romans to build roads on which excessive mud and dust did not alternate, according to the weather, and ruts prevailed the greater part of the time. About 1775, Tresaguet, in France, and about 1820 and 1825, Macadam and Telford, in England, introduced the system of surfacing carefully prepared earth road beds with broken stone. Both Tresaguet and Telford used a foundation course of large stones on edge, with small stones above, packed together to form a relatively firm surface to wheels and hoofs, but Macadam used small stone from top to bottom. About 1830 France adopted Macadam's plan, and since then it has developed a magnificent system of national roads. The use of broken stone for roads has since spread to all civilized countries, or to their thickly populated sections. As a rule, macadam or macadamized is the term used to designate these

roads, even when they have the large stone base of Telford. Road materials now include dirt, gravel, broken stone, and various cementing materials, which serve as binders and dust preventives. In the United States, the need for improved highways from the seaboard to the great interior, which was then being opened up, finally resulted in the beginning of the construction of the National Road, or Cumberland Road, from Cumberland, Md., on the Potomac, toward the Ohio River in 1806. In thirty years this road reached Vandalia, Ill. The railways did not stop road or highway building; rather they helped to settle the whole country, East and West, so rapidly that it soon became covered with an ever increasing network of roads; but numerous as these roads were, it was not until well toward the close of the 19th century that their condition was much better than at the time of the Revolution. Funds for roads being limited in the early days, many roads were constructed at private expense on which a toll was collected.

Systematic road improvement in the United States began with the adoption of the State Aid plan in New Jersey in 1891-2. Massachusetts, Connecticut, Rhode Island, and New York followed, the last named in 1898; other states have since adopted the same general system. The fundamental idea of the State Aid plan is the contribution by the state of a part of the cost of improving roads, the balance being met by the towns, the county or both. Federal aid in State-road construction began with \$5,000,000 in 1917. In the fiscal year of 1941-42 the sum of \$154,359,871 of Federal money was allotted for the improvement of roads, highways, streets, etc.

**Roan Antelope**, one of the largest, finest and best known of South African antelopes. It is a near relative of the sable antelope.

**Roanne**, town, France. The church of St. Pierre, the remains of a 14th to 16th century castle, and the Hôtel de Ville, with its fine collection of antiquities, are interesting; p. 38,469.

**Roanoke**, city, Virginia. In the vicinity are many features of scenic interest, including the Roanoke river, natural stone bridge, Mountain Lake, Mill Mountain, Robert Lee's tomb, Grottoes Cavern, the Peaks of Otter, Luray Cavern, and fine mountain views. There are many widely known mineral springs in the region. Virginia College for girls is situated about a m. from the city, and Hollins College, also for girls, is seven

m. to the n. The leading industrial establishments are large railroad shops, pyrites plants, bridges and structural iron works, iron furnaces; p. 69, 287.

**Roanoke Island**, an island off the coast of North Carolina. It was the scene of an unsuccessful attempt at colonization by Sir Walter Raleigh in 1585-87.

**Roaring**, a disease of the horse.

**Roaring Forties**, a sailor's term for the regions of the Southern Ocean, s. of lat. 40° s., where the prevailing winds are from the n.w. and often stormy.

**Robber Flies**, powerful predatory insects of the family Asilidæ, particularly destructive to honey bees.

**Robbery**, the unlawful taking of personal property from the person or in the presence of another, against his will, by means of force or violence, or fear of injury, immediate or future, to his person or property. Robbery is a felony, and in all States is punished by a long term of imprisonment, twenty years being the average maximum penalty.

**Robbia, Andrea della** (1437-1528), Florentine sculptor. A fine specimen of his work is a retable of the *Assumption* in the Metropolitan Museum, New York.

**Robbia, Luca della** (1399-1482), Florentine sculptor, was brought up as a goldsmith. In sculpture he executed ten fine panels for the choir gallery of the cathedral at Florence (1431-40); reliefs for the campanile (1437); a remarkably fine bronze door for the sacristy of the cathedral (1446-67); and the tomb of the bishop of Fiesole (1457-8). In the latter part of his life he worked principally at terra-cotta reliefs, covered with enamel in polychrome. For this work (Della Robbia ware) he indeed founded a school.

**Robbins, Wilford Lash** (1859-1927), American Protestant Episcopal clergyman, was born in Boston. In 1903 he was chosen dean of the General Theological Seminary in New York City. His publications include *An Essay Toward Faith* (1900) and *A Christian Apologetic* (1902).

**Robert I. (of Scotland)**. See **Bruce, Robert**.

**Robert II.** (1316-90), king of Scotland from 1371 to his death. He became the founder of the Stewart dynasty. The most notable incidents of Robert's reign were the invasions of Scotland by an English military and naval force under the command of the Duke of Lancaster in 1384, and again by King Richard II. in 1385, which wasted the

land as far as Edinburgh and Fife, and the grand retaliatory expedition of the Scotch in 1388.

**Robert III.** (c. 1340-1406), king of Scotland from 1370 to 1406, son of Robert II. The principal events in Robert's reign were the invasion of Scotland in 1400 by Henry IV. of England, who penetrated as far as Edinburgh, and the retaliatory expedition of the Scotch, two years after, under Archibald Douglas, which resulted in the terrible disaster at Homildon Hill.

**Robert I.**, surnamed **le Diable** (d. 1035), Duke of Normandy. In 1035 he made a pilgrimage to the Holy Land, on the way home from which he died at Nicæa. His son was William the Conqueror of England.

**Robert, Christopher Rhinelander** (1802-78), an American manufacturer and philanthropist, was born in Brookhaven, N. Y. Having become interested in Turkish education while visiting Constantinople during the Crimean War, he established Robert College in Constantinople.

**Robert College**, an institution of higher learning for men at Constantinople, founded by Christopher R. Robert, of New York, and opened in 1863. The college is situated on the shores of the Bosphorus. Preparatory, Collegiate, and Engineering Departments, with courses leading to the degrees of B.A. and B.S., furnish instruction in the usual branches, and in the vernacular of the students, who include Greeks, Armenians, Turks, Bulgarians, Albanians, Hebrews, and Persians. The instruction is non-sectarian.

**Robert of Gloucester** (fl. 1260-1300), British chronicler, born during the reign of Henry III. He is the author of a rhymed *Chronicle* of English history, from the Trojan War until the close of the reign of Henry III. It is chiefly valuable for its linguistic interest.

**Roberts, Benjamin Stone** (1811-75), American soldier, was born in Manchester, Vt. In the Civil War he served in the operations in New Mexico and in the second Bull Run campaign; commanded an expedition against the Chippewa Indians; and participated in numerous other campaigns. He was the inventor of the Roberts breech-loading rifle.

**Roberts, Benjamin Titus** (1823-93), American clergyman, was born in Leon, N. Y. In 1860, with other ministers in sympathy with his opinions, he founded the Free Methodist Church.

**Roberts, Brigham Henry** (1857-1933), American Mormon, was born in Warring-



ton, Lancashire, England.

**Roberts, Charles George Douglas** (1860- ), Canadian poet and writer, was born in Douglas, New Brunswick. Roberts is one of the leading poets of Canada, and his work largely interprets characteristic Canadian scenery and natural history. His sympathetic interpretation of animal life has won him the title 'Poet Laureate of the Animal World.' He has written in verse: *Orion* (1880); *In Divers Tones* (1887); *New Poems* (1919); *The Sweet o' the Year* (1925). His prose includes *A History of Canada* (1897); *A Sister to Evangeline* (1898).

**Roberts, Elizabeth Madox** (1885- ), Am. novelist, born in Springfield, Ky.; wrote *The Time of Man* (1926); *My Heart and My Flesh* (1927); *He Sent Forth a Raven* (1935).

**Roberts, Ellis Henry** (1827-1918), American public official, was born in Utica, N. Y. He was assistant treasurer of the United States at New York (1889-93), and treasurer of the United States (1897-1905).

**Roberts, Kenneth Lewis** (1885- ), Am. writer, born Kennebunk, Maine; ed. Cornell. His works include *Arundel* (1930); *Northwest Passage* (1937); *Rabble in Arms* (1933); *Oliver Wiswell* (1940).

**Roberts, Morley** (1857- ), English novelist, was born in London. His writings, many of them drawing upon the incidents of his adventurous life, include *The Western Avernus* (1887); *King Billy of Ballarat* (1891); *Immortal Youth* (1902); *Midsummer Madness* (1909); *Gloomy Fanny* (1913); *On the Earthquake Line* (1924); *Farewell to Letters* (1933).

**Roberts, Owen Josephus** (1875- ), American jurist, was born in Germantown, Pa. In 1924 he was appointed by President Coolidge to prosecute the Teapot Dome oil cases, and in 1930 was appointed by President Hoover to the United States Supreme Court to fill the place of Justice Sanford, deceased.

**Roberts, William Milnor** (1810-81), American civil engineer, was born in Philadelphia. He constructed the bridge across the Susquehanna River at Harrisburg, the first combined railroad and passenger bridge in the United States.

**Roberts of Kandahar, Sir Frederick Sleigh Roberts, Earl** (1832-1914), British field marshal, was born in Cawnpur, India. While at Kabul he was informed of the total defeat of General Burrows at Maiwand by

an Afghan force, which had then laid siege to Kandahar (July, 1880). Roberts at once organized a force of some 10,000 men, and set off for Kandahar on August 9. On the morning of August 31 he entered that town, having covered a distance of 300 m. through difficult mountainous country; attacked the Afghans, and completely routed them. In 1885 Roberts was made commander-in-chief of India, and in 1886 he commanded the army in Burma. After the defeat of General Buller at Colenso, on Dec. 15, 1899, in the Boer War, Lord Roberts was appointed commander-in-chief in South Africa. On his return to England he was appointed commander-in-chief of the British army.

**Robertson, Howard Morley** (1888- ), Registered Architect of the State of New York, was born in Salt Lake City, Utah; Chairman of Public Relationships Committee of Building Industries National Council, 1932-33. Among his publications are *Principles of Architectural Composition* (1924); *Modern Architectural Design* (1932).

**Robertson, James** (1725-88), British soldier, was born in Fifeshire, Scotland. He served in the defence of Boston (1775-6), and commanded a brigade at Long Island. In 1777 he went to England; but returned as major-general and civil governor of New York in 1780, where his corrupt and harsh rule alienated many of the Loyalists.

**Robertson, James** (1742-1814), American pioneer, was born in Brunswick co., Va. In 1770 he accompanied Daniel Boone across the mountains, and in 1771 led a body of settlers to the Watauga Valley. He defeated an attack by the Cherokees in 1776; and in 1778 he explored the Cumberland region and founded a settlement at what is now Nashville, Tenn.

**Robertson, Thomas William** (1829-71), English actor and dramatist. His first success was made in 1864 with a play founded on his novel of *David Garrick*. It was followed by *Society* (1865) and *Ours* (1866). *Caste*, Robertson's best work, was produced in 1867, *Play* in 1868, *School* in 1869, and *M. P.* in 1870.

**Robeson, Paul Bustill** (1898- ), Negro bass singer and actor, was born in Princeton, N. J., and educated at Rutgers College and Columbia U. His first stage appearance was in New York City, 1921. In 1923 he acted the part of Jones in O'Neill's *The Emperor Jones*. In 1928 he sang 'Ole Man River' in the *Show Boat*. He has played

*Othello* in England, and has made concert tours throughout Europe and America. He was received with enthusiasm in Moscow in 1934, but the broadcasting of one of his spirituals caused the dismissal of six Soviet wireless officials.

**Robespierre, Maximilien Marie Isidore** (1758-94), French revolutionist, was a lawyer of Irish origin, born at Arras, who early accepted the views of Rousseau. During 1790 Robespierre gained great popularity and influence in the Jacobin Club, and on the death of Mirabeau (April 2, 1791) he was recognized as a revolutionary leader. On May 10, 1791, he carried his famous but fatal motion that no member of the Constituent Assembly should be elected to the forthcoming Legislative Assembly. He urged the execution of Louis XVI. as a matter of policy, and on Dec. 3, 1792, spoke against granting the king a



Lord Roberts of Kandahar.

trial. On the triumph of the Mountain he became the leading man in France, and on July 27, 1793, was elected a member of the Great Committee of Public Safety. The next scenes in the great drama of Revolution were the dark intrigues and desperate struggles that sent Hébert and his friends to the scaffold on March 24, 1794, and Danton and Robespierre's schoolfellow, Camille Desmoulins, on April 5. The next three months Robespierre reigned supreme, but his supremacy prepared the way for his inevitable fall. On July 26

(8th Thermidor), after about a month's absence, the Dictator delivered a long harangue complaining that he was being accused of crimes unjustly. Next day, neither he nor Saint-Just could be heard, and an unknown deputy named Louchet proposed that Robespierre should be arrested. At the fatal words his power crumbled into ruins, and he was put under arrest. Next day (July 28; 10th Thermidor, 1794), the miserable, trembling wretch died with Saint-Just, Couthon, and nineteen others by the guillotine.

**Robin, American**, the most common and familiar of North American thrushes, more or less resident throughout the United States. It is named for its ruddy breast, which resembles that of the English robin, and is noted for its boldness and gayety, its attractive plumage, and its virile song.

**Robin Goodfellow.** See **Puck**.

**Robin Hood**, the predominant figure in a series of English ballads, plays, and tales, popularly regarded as the leader of a band of outlaws who ranged through the forest of Sherwood in Nottinghamshire and South Yorkshire. He was reputed an excellent archer and skilful with the quarter-staff; while his characteristic of plundering the rich only, and giving of his surplus to the poor, has endeared him to the popular imagination.

**Robinia**, a genus of North American hardy trees and shrubs belonging to the order Leguminosæ. *R. pseudacacia* is the common locust, bearing fragrant, drooping racemes of white flowers.

**Robins, Benjamin** (1707-51), English mathematician, was born in Bath. He invented the ballistic pendulum.

**Robinson, Charles** (1818-94), American legislator, was born in Hardwick, Mass. In 1854 he went to Kansas as confidential agent of the New England Emigrants' Aid Society, and settled in Lawrence. He became the leader of the Free-State party, and in 1855 was a member of the Topeka Convention, which drew up a constitution prohibiting slavery for the projected State. In the election that followed he was chosen governor.

**Robinson, Edward** (1858-1931), American archaeologist, was born in Boston, Mass. In 1906 he became assistant director, and in 1910 director, of the Metropolitan Museum of Art in New York City. He was an authority on classical art and antiquities, and has contributed archaeological articles to various periodicals.

**Robinson, Edwin Arlington** (1869-

1935), American poet, was born in Head Tide, Me. In 1922, 1925, 1928, he received the Pulitzer prize for poetry. His works include *The Children of the Night* (1897); *The Town down the River* (1910); *Tristram* (1927); *Nicodemus* (1932); *Amaranth* (1934).

**Robinson, Frederick B.** (1883-1941), college president, was born in Brooklyn, New York. Since 1927 he has been president of the College of the City of New York. In 1930 he was president of the Association of Colleges and Universities of the State of New York, and in 1933, chairman of the American League for Human Rights. In 1934-35, there were student demonstrations at City College in which Robinson was criticized, but the faculty stood by him. His writings include *Effective Public Speaking* (1914); *Business Costs* (1921).

**Robinson, James Harvey** (1863-1936), American historian, was born in Bloomington, Ill. He was professor of history in Columbia University from 1895 to 1919, when he resigned to help organize the New School for Social Research. His published works include *Introduction to the History of Western Europe* (1903); *Readings in European History* (2 vols., 1904-5); *The Mind in the Making* (1921); *The Humanizing of Knowledge* (1923); *The Ordeal of Civilization* (1926).

**Robinson, Joseph Taylor** (1872-1937), politician, served successively as Congressman, Governor of Arkansas and U. S. Senator (1913-37). As Democratic leader of the Senate, Robinson challenged Huey Long's Share-the-Wealth campaign in 1935 and led the futile effort for ratification of the World Court protocol.

**Robinson, Lennox** (1886- ), Irish dramatist, director of Abbey Theatre, Dublin. His plays include *The Dreamers* (1915); *The White-Headed Boy* (1920); *The Round Table* (1924); *Is Life Worth Living?* (1933).

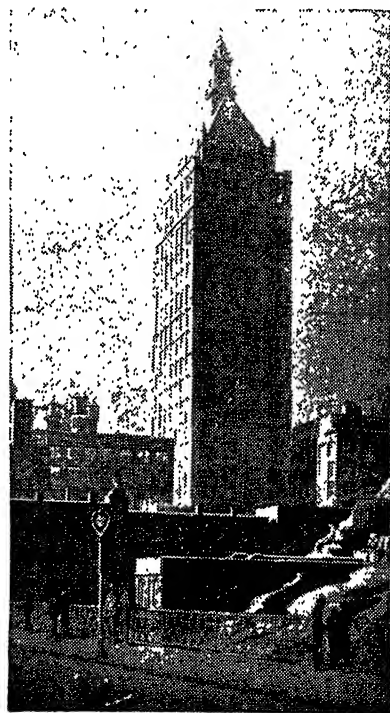
**Robinson, Theodore** (1852-96), American landscape painter, was born in Irasburg, Vt. He delighted in robust masses of color and a glowing palette so far from academic precedent that one of his best pictures, *Hudson River Canal*, was rejected when offered to the New York Metropolitan Museum, an act which aroused a storm of protest.

**Robinson Crusoe.** See **Selkirk, Alexander.**

**Robot.**—A machine that makes it possible to control vast energy sources obtained in nature; an automaton that performs all hard work; hence one who works mechanically.

The word is derived from *robota* (Russian, *work*). Interest centers in the first definition. In some robots photo-electric cells operate in relays at any change of light intensity, thus controlling powerful machinery. In others the principles of the telephone, with the thermionic vacuum tube, operate in response to sound and perform various kinds of motion at a distance. Robots do such work as chemical testing, difficult mathematical calculations, the accurate steering of ships and airplanes; tide prediction; traffic control. As processing machines in factories they control temperature, humidity, starting, stopping, give danger signals, etc. on a time schedule.

**Rob Roy** (1671-1734), the sobriquet (derived from his thick red hair) of Robert Macgregor, Scottish outlaw, who, on the renewal



Eastman Building, Rochester, N. Y.

of the penal acts against the Clan Macgregor in 1693, adopted Campbell as his surname. His feats, adventures, and escapes from custody bordered on the marvellous.

**Robson, Eleanor Elsie** (1880), American actress, was born in England and made her professional *début* in San Francisco (1897). In 1903-5 she starred in *Merely Mary Ann*.

both in the United States and England; and in 1905 headed an all-star production of Goldsmith's *She Swoops to Conquer*. She scored her greatest successes in *Salomy Jane* (1907) and *The Dawn of a To-Morrow* (1910). In 1910 she married August Belmont and retired from the stage.

**Roc**, or **Rukh**, a fabuolus bird that in the *Arabian Nights* carried Sindbad the Sailor out of the Valley of Diamonds and was able to lift an elephant.

**Rocamble**, a perennial plant, occasionally cultivated for its bulbs, which are used much as garlic, but possess a milder flavor.

**Rochambeau, Jean Baptiste Donatien de Vimeur, Comte de** (1725-1807), French soldier, was born in Vendôme. In 1769 he became inspector-general in the French army, and in 1780 lieutenant-general. In the latter year he was sent to America, with 6,000 regulars, to aid in the expulsion of the British. In the siege of Yorktown, Rochambeau and Count de Saint-Simon led two assaults on the British defences. On Oct. 19, Cornwallis surrendered. For his services Rochambeau received the thanks of Congress. He returned to France in 1783. In 1791 he was made a field-marshal, and for a time commanded the Army of the North; but the excesses of the revolutionary leaders led to his resignation in May, 1792. In 1804 Napoleon made him a grand officer of the Legion of Honor and granted him a pension. A statue of Rochambeau was unveiled in Washington, D. C., in 1902.

**Rochdale**, borough, Lancashire, England. The Church of St. Chad (12th century) retains portions of ancient architecture. It is an important manufacturing center (wool, cotton, etc., textiles). The first coöperative society was established here in 1844. Lord Byron's family were barons of Rochdale for more than 200 years; p. (1931) 90,278.

**Roche, Sir Boyle** (1743-1807), Irish legislator, was born in county Galway. He was present at the siege of Quebec and served in the American Revolution. He was noted for his wit, being called the 'father of bulls.'

**Rochefort-Luçay, Victor Henri, Marquis de** (1830-1913), French journalist and politician, was on the staff of the *Figaro* from 1863 to 1865; then started the *Lanterne* (1868); and for violent attacks on the imperial family was sentenced to two years' imprisonment and his paper suppressed. He escaped to Brussels, where he remained till 1869,

when he was elected to the Chamber of Deputies, returned to Paris, and founded the *Marseillaise*. After a period of exile, he started *L'Intransigeant*, which he edited until 1907, and attacked all governments in turn.

**Rochefort**, capital of Rochefort Arrondissement, department Charente-Inférieure, France. It has a naval harbor surrounded by forts. It dates its importance from 1665 when it was designated a repairing port by Colbert. Here Napoleon surrendered to Captain Maitland, July, 1815; p. 26,452.

**Rochefoucauld**. See **La Rochefoucauld**.

**Rochelle, La**, seaport town, capital of the department of Charente-Inférieure, France. The most interesting building is the Hôtel de Ville, erected in 1486-1607. Important industries are agriculture, fishing, shipbuilding. It was a Huguenot stronghold in the 16th century and in 1572 withstood a six-months' siege. In 1627-8 it was besieged for fourteen months before Richelieu could force its surrender; p. 45,043.

**Rochelle Salt**, a mild laxative salt, consisting of the double tartrate of potassium and sodium and having the formula  $\text{KNaC}_4\text{H}_6\text{O}_6 + 4\text{H}_2\text{O}$ .

**Rochester**, city, Minnesota. It is the seat of the famous Mayo Clinic founded by Charles and William Mayo; p. 26,312.

**Rochester**, city, New York. The Erie Canal (completed in 1825) played a conspicuous part in building up the commerce of Rochester. The old Erie Canal has been abandoned in favor of the New Barge Canal, s. of the city. Advantages for higher education are offered through the University of Rochester, Rochester Athenaeum and Mechanics Institute, Colgate-Rochester Divinity School, Nazareth College, St. Andrew's and St. Bernard's Seminary. In 1922, the Eastman Theatre, the third in size in the United States, was built, through the generosity of George Eastman, who also founded the Eastman School of Music.

Rochester is best known for the manufacture of photographic film, cameras, mail chutes, optical goods, check protectors, thermometers, office systems, enameled steel tanks and horticultural products. It is a distributing center for the agricultural products of a large section, and has a heavy lake traffic. The combined factors of railroad, hydro-electric power, motor truck and bus, canal, steamship lines on Lake Ontario, and air

transport have made Rochester one of the outstanding cities in the country in transportation facilities; p. 324,975.

The first settler came to this locality in 1788, but the first frame house was not erected until 1812, on the site of the present Powers Building. The first proprietors of the land were three Maryland men, Nathaniel Rochester, William Fitzhugh, and Charles Carroll. In 1817 the village was incorporated as Rochester-ville, and five years later the name was changed to Rochester. An era of rapid progress began with the opening of the Erie Canal in 1825. Noteworthy political activity centered in Rochester in connection with the Anti-Masonic party and the anti-slavery movement. William Morgan, the Mason, was a resident of Rochester, as were also Myron Holley and Frederick Douglass, the abolitionist leaders.

**Rochester**, municipal and parliamentary borough, city and seaport, Kent, England. The cathedral, which dates chiefly from the 11th and 12th centuries, is especially notable for its Norman doorway and its fine 13th century frescoes. Other buildings of interest are the Guildhall (17th century) and Watt's Charity House (1579). Remains exist of the walls (13th century) which once surrounded the city. Charles Dickens' home at Gadshill is only 4 m. distant; p. 31,196.

**Rochester, John Wilmot**, Second Earl of (1647-80), English poet and courtier. His wit and social habits gained him great favor with Charles II. He posed as a patron of letters—Dryden, Nat Lee, Otway, and others enjoying his favor.

**Rochester, Nathaniel** (1752-1831), American pioneer, was born in Westmoreland co., Va. In 1802 with Charles Carroll and William Fitzhugh, he bought the land on which Rochester, N. Y., now stands, and in 1812 a settlement was made there, called Rochester-ville. Rochester went to Western New York in 1810, but did not settle in Rochester until 1818. He was active in the movement for the construction of the Erie Canal.

**Rochester Athenæum and Mechanics Institute**, a non-sectarian training school for both sexes in Rochester, N. Y., founded in 1885, and supported almost entirely by tuition fees and contributions from citizens of Rochester.

**Rochester Theological Seminary**, a divinity school in Rochester, N. Y., founded in 1850 by the New York Baptist Union for

Ministerial Education, and open to students of all denominations holding a college degree.

**Rochester, University of**, a coeducational institution for higher education at Rochester, N. Y., was founded in 1850 and incorporated in 1851. It was Baptist in origin, but is now non-sectarian. Women were first admitted in 1900; in 1912 it was decided to provide coöperate instruction in separate classes for men and women, and in 1914 the separation into a College for Men and a College for Women was completed. In 1919 the Eastman School of Music was instituted, for which Mr. George Eastman contributed \$4,500,000. The School of Medicine and Dentistry was founded in 1920 with gifts from Mr. George Eastman (\$4,000,000) and from the General Education Board (\$5,000,000), affiliated with the Rochester Dental Dispensary (\$3,500,000).

**Rochet**, a close-fitting linen garment worn by bishops of the Anglican Church under the chimere, or black satin robe to which the lawn sleeves are usually attached. Roman Catholic bishops and abbots usually wear the rochet under a manteletta.

**Rockaway Beach**, seaside resort of Long Island, New York.

**Rock Basins** are surface hollows, usually occupied by lakes or marshes, everywhere surrounded by barriers of rock. One school of geologists teaches that during the Ice Age these valleys were filled with glaciers many hundreds of feet thick, and that where the ice accumulated to greatest depth, and when it was in most rapid motion, it ground out the rocky floor on which it rested, thus producing hollows.

**Rock Bass**, also known as Redeye or Goggle-eye, is one of the commonest of the basses.

**Rockefeller, John Davison, Sr.** (1839-1937), American capitalist, was born in Richmond, Tioga co., N. Y. In 1858 he entered business independently with a partner named Clark; and in 1862, with another partner by the name of Andrews, he embarked in the business of refining petroleum. Two years later his brother William was received into partnership, and in 1865 a new refinery, called the Standard Oil Refinery, was established by them. Five years later the various branches were combined under the name of the Standard Oil Company, with John D. Rockefeller as president and leading spirit. He became one of the richest men in the world. He retired from business in 1911, and

turned his attention to the philanthropic enterprises which he had been developing. He founded the University of Chicago in 1890. Many educational institutions have benefited by his gifts through the General Education Board, which he founded in 1903. Besides this, many institutions have received contributions from his personal funds. He founded the Rockefeller Institute for Medical Research in 1901, the Rockefeller Foundation in 1913, and the Laura Spelman Rockefeller Memorial in 1918 (consolidated with the Rockefeller Foundation in 1929). Altogether he contributed more than \$500,000,000 to educational and public welfare organizations, of which nearly four-fifths went to the four charitable corporations which he created.

**Rockefeller, John Davison, Jr.** (1874- ), American capitalist was born in Cleveland, O. He became associated with his father, John D. Rockefeller, Sr., in various enterprises. He became a director of the Colorado Fuel and Iron Company, and as such was an important witness before the Federal Industrial Relations Commissions following the Colorado Miners' Strike, beginning in 1913. He organized the Bureau of Social Hygiene, and is a member of the Rockefeller Foundation, General Education Board and Rockefeller Institute for Medical Research. He aided the Byrd expeditions to the North and South Poles. He is the author of *The Personal Relation in Industry* (1917).

**Rockefeller, Nelson A.**, (1909), son of John D. Rockefeller, Jr. In 1942 he became U. S. Coordinator of Inter-American Affairs. He is president of Rockefeller Center.

After stating, in 1945, that Argentina was still the 'black sheep' of the Western hemisphere he resigned as Asst. Secy. of State in charge of Latin American affairs.

**Rockefeller, William** (1841-1922), American capitalist, brother of John D. Rockefeller, Sr., was born in Richford, Tioga co., N. Y. He was president of the Standard Oil Company of New York (1865-1911), and vice-president of the Standard Oil Company of New Jersey (1865-1911) and was connected with numerous business enterprises.

**Rockefeller Center**, a district in New York City, developed by John D. Rockefeller Jr., as a musical and radio center. It comprises three large city blocks, from 48th to 51st Streets, between Fifth and Sixth Avenues. The Radio City section of the development is the 70-story RCA building, the RKO office building, the Radio City

Music Hall and the Center Theater. The Fifth Avenue approach is by way of a Promenade, 60 ft. wide and 200 ft. long, between 49th and 50th Streets. This thoroughfare slopes down to a sunken plaza, with a sculptural fountain by Paul Manship. The RCA Building is the world's largest office building in floor space. La Maison Française, a 7-story office building, has a frontage of 70 ft. on Fifth Avenue and on Rockefeller Plaza. The British Empire Building is tenanted by British and Anglo-American shops. The Palazzo d'Italia has 6 stories. The Radio City Music Hall is the world's largest theater, and has one of the largest pipe organs ever built.

**Rockefeller Foundation**, a corporation proposed by John D. Rockefeller, Sr., in 1910, chartered by the New York State legislature in 1913, and endorsed by Mr. Rockefeller, for the object of 'promoting the well-being of mankind throughout the world,' was consolidated with the Laura Spelman Rockefeller Memorial in 1929 (net capital about \$168,000,000). The work of the Foundation deals primarily with the advancement of knowledge and is administered under a president through the International Health Division and four directors, one each for the Natural Sciences, Medical Sciences, Social Sciences, and the Humanities. After providing for buildings and endowments of medical schools, the department of Medical Sciences shifted its support to specific research programs and specialized in psychiatric problems. The department of Natural Sciences centered its interest on research in paleontology, meteorology, astronomy, physics, chemistry, and biology. The department of Humanities aided foreign scholars, groups and institutions in humanistic research. For public health research money distribution was practically world-wide and was contributed for the study of yellow fever, malaria, tuberculosis, hookworm disease, common colds, undulant fever, yaws, schistosomiasis and typhoid fever. Funds were provided for the support of international fellowships in public health and for the aid of the central health administration of governments and counties. Appropriations in 1938 amounted to about \$17,000,000.

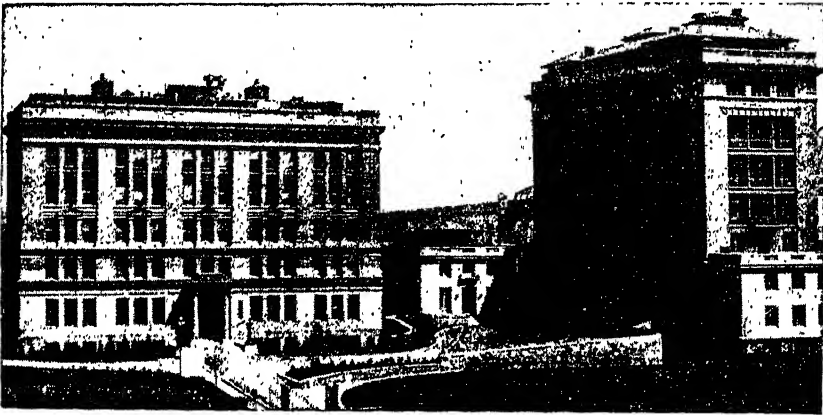
**Rockefeller Institute for Medical Research**, an institution founded by John D. Rockefeller, Sr., in 1901, which announced as its purpose 'the investigation of such problems in medicine and hygiene as have a practical bearing on the prevention and cure of

disease.' With the initial gift of \$200,000, scholarships and fellowships were distributed among existing laboratories throughout the country; but the need of greater concentration in the work was met by the further donation of \$1,000,000 for land and building purposes. Mr. Rockefeller gave \$2,600,000 for endowment purposes in 1907. The Institute has three departments: the department of laboratories, department of the hospital, and the department of animal and plant pathology.

**Rocket Flight** denotes a method, as yet unachieved, of flying and conveying by power-driven 'rockets' or projectiles instead of the familiar airplane, airship or balloon. In

have all contributed to the aspiration of a human expedition to the moon—and a safe return. Already in 1930 Robert Esnault-Pelterie of France, an expert on the rocket system of propulsion, had published a work on interstellar navigation and outlined plans for a moon flight, with the confident prediction that this would be accomplished within the next 15 years. Radio and television would be employed to describe the flight while in progress. Important experiments with rockets have been recently conducted in the U. S. by Prof. R. H. Goddard.

**Rockets**, in warfare, are used for making signals, for setting fire to buildings or shipping, or as projectiles. Signal rockets gener-



*Rockefeller Institute for Medical Research, New York City.*

1865 the ingenious French novelist Jules Verne published a fantastic but fascinating story, *From the Earth to the Moon*. In this imaginary voyage, made by three adventurous scientists, the aerial vehicle was an elaborately constructed projectile, fired from a huge cannon deeply rooted in the earth, and aimed towards the moon. Grotesque and impossible as the story seemed for more than half a century, modern scientists have been taking the matter very seriously, for Verne had woven fiction around airplanes, airships, submarines and television long before any one of those marvels existed. The remarkable stratosphere ascents of Piccard (1931 and 1932), and of the Russian Goltzman in 1933; the development of motors and propellers, the experimental rocket engine of Paul Heylandt (Germany, 1931), and a rocket turbine for airplanes patented by R. H. Goddard (U. S. A., 1931),

ally have a tubular case and head of stout paper. The head contains a composition which when ignited bursts into stars of various colors; the bottom is choked until it forms a single vent in the center, where the rocket is lighted. They are fired from a rocket trough, by which the required elevation may be given.

**Rockfish**, the name of many fishes notable for haunting rocky parts of the coast or bottom. The term is most distinctively applied to the numerous species of the family Scorpenidae, found chiefly on the Pacific Coast of the United States and in Japan. The group is composed of gaily colored, viviparous, marine shore fishes, varying in length from 10 in. to 3 ft.

**Rockford**, city, Illinois. The finest grades of furniture are produced and more walnut is consumed than by any other furniture center in the country. Other leading manufac-

tured products are knit goods, agricultural implements, machine tools, foundry products, gas stoves, pianos. Rockford is the seat of Rockford College; p. 84,637.

**Rockford College**, a non-sectarian institution for the higher education of women, organized at Rockford, Ill., in 1849. A collegiate course was added to the seminary course in 1882, and in 1892 the latter was discontinued, and the name of the institution was changed to Rockford College for Women.

**Rockhill, William Woodville** (1854-1914), American diplomat, was born in Philadelphia. In 1897-9 he was minister to Greece, Roumania, and Serbia. He was appointed special commissioner to China in 1900, and in 1901 represented the United States in the Congress at Peking for the settlement of the Boxer troubles. He was director of the International Bureau of American Republics from 1899 to 1905. In 1905 he was appointed minister to China; in 1909, Ambassador to Russia; and in 1911, Ambassador to Turkey.

**Rockingham, Charles Watson-Wentworth**, Second Marquis of (1730-82), British prime minister. He became premier (1765), but court influence and the repeal of the Stamp Act, which won him favor with the American colonies, caused his dismissal in favor of Pitt (1766). He vigorously opposed Lord North's disastrous policy with regard to the American colonies, and on the latter's overthrow (1782) formed his second ministry.

**Rocking Stones**, masses of rock poised on a projecting corner so delicately that a slight force is sufficient to set them rocking. They are numerous in Yorkshire, Derbyshire, Cornwall and Wales. The famous Logan Rock near Land's End in Cornwall is computed to weigh over 70 tons. The largest rocking stone in the world is one at Tandil in Argentina, which weighs over 700 tons.

**Rock Island**, city, Illinois, on the Mississippi River. A dam constructed by the Federal Government affords abundant water power for manufacturing and for the extensive shops of the United States Arsenal, the largest manufacturing arsenal in the country, which occupies an island in the river; p. 42,775.

**Rockling** (*Motella*), a genus of North Atlantic fish belonging to the cod family.

**Rockne, Knute** (1888-1931), famous American football coach, was born in Voss, Norway. After working as a railroad brakeman and mail clerk, he saved enough to enter

Notre Dame University, where he became instructor in chemistry and was graduated in 1914 with B.S. degree. The same year he was appointed assistant football coach, and head coach in 1918, succeeding Jesse C. Harper, resigned. Rockne's genius in perfecting football strategy made athletic history. From 1918 to 1930 inclusive, his teams won 105 games, lost 12, and tied in five. He was killed in an airplane crash with seven others near Bazaar, Kansas, March 31.

**Rock Plants**, plants which thrive best when planted among stones or rocks, so that their roots are able to tap the subjacent water in times of drought.

**Rockport**, town, Massachusetts. It is beautifully situated at the end of Cape Ann, and is a popular summer resort. The leading industries are fishing and quarrying; p. 3,550.

**Rock Rose**, a genus (*Cistus*) of beautiful flowering shrubs, natives of Southwest Europe, North Africa, and Asia Minor.

**Rocks**, a geological term which includes all those masses of which the earth's crust consists, whether they be in a hard and compact state or occur as unconsolidated sands, gravels, clays, and soils. All rocks consist of minerals, and most are aggregates of several minerals, such as quartz, feldspar, mica, augite, hornblende, calcite, siderite, olivine, and the oxides of iron. The three main groups of rocks are: the sedimentary sandstone; the igneous granite; the metamorphic gneiss. The sedimentary rocks alone contain fossils or remains of animals and plants which lived at the time these rocks were being laid down, and in some of them such fragments are the principal components.

**Rock Salt**. See **Salt**.

**Rock Shaft**, a machine shaft which does not make a complete revolution.

**Rock Soap**, a soft dark-blue or black substance, consisting of impure hydrous aluminum silicate, which is used in making crayons and pencils.

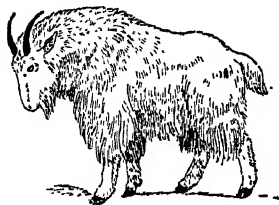
**Rock Temples**. Temples in rocks were numerous in ancient Egypt and Nubia. They are of two classes—the true rock temple, or *speos*, and the *hemi-speos*, the exterior half of the latter being an open-air building. Of these may be cited the *speos* at Abu Simbel, which penetrates 180 ft. into the rock, and is guarded in front by four seated colossi, 66 ft. high; and the *hemi-speos*, constructed by Queen Hatshepsut at Deir-el-Bahari.

**Rock Wren**, a wren (*Salpinctes obsoletus*) numerous in the arid, southwestern part of the United States, frequenting rocky ravines



and singing with surprising force and beauty.

**Rocky Mountain Goat** (*Haploceros montanus*), one of the few hollow-horned ruminants found in America, and combining the characteristics of goats and antelopes. It is about the size of a large sheep, and is remarkable for its coat of long white, very soft and warm hair. The head bears a pair of jet-black horns, about six inches long, and the limbs



*Rocky Mountain Goat.*

are short and strong. The animal is distributed over the Rocky Mts. from northwestern Montana to central Alaska, but everywhere keeps to the tops of the mountains, not descending below the edge of the forest growth. It moves about in small family parties, scaling and descending cliffs and declivities with wonderful skill.

**Rocky Mountains**, a great system of mountain ranges in North America extending from Alaska to Mexico. The original name, 'Stony Mountains,' refers to their rugged bare rock character, and was applied specifically to the ranges forming the eastern front within the borders of the U. S. The more popular name, Rocky Mountains, includes all of the complex series of mountain ranges lying to the e. of the Sierra Nevada and Cascades. In a broader usage the term includes all ranges between the Great Plains and the Pacific Ocean.

The greatest width of this very complex belt is between latitude 38° and 42° N., where it reaches 1,000 m. The total area occupied by these mountains within the borders of the U. S. is 980,000 sq. m. The whole system is also known as the North American Cordilleras. The Rocky Mountain system, in its broadest sense, is continuous with the Sierra Madre and related ranges to Mexico. The main range of the Rocky Mountains proper in the United States terminates near Santa Fe, in New Mexico.

About Yellowstone Park are peaks reaching 12,000 ft., while in the Wind river and Teton ranges, s. of the Park, are summits reaching nearly 14,000 ft., such as Frémont Peak (13,790 ft.) and Grand Teton (13,747 ft.). South

of the central Wyoming depression the first great mountain range is the Colorado, or Front Range, which contains peaks exceeding 14,000 ft. in height. Among these are Long's Peak (14,271), Gray's Peak (14,341), Torrey's Peak (14,336), and Pike's Peak (14,108). This range rises almost abruptly from the margin of the Great Plains, which in their western parts average 5,000 to 6,000 ft. in elevation. It is therefore one of the most impressive portions of the Rockies.

The Desert or Basin Ranges occupy the most arid region of Western Utah and Nevada. The easternmost of this group, the Wasatch Range, rises with extreme abruptness from the plain of Salt Lake, 5,000 to 6,000 ft., giving a most beautiful and picturesque background to this rich agricultural valley. Still w. of this lies the Sierra Nevada of California, a single great range terminating in the n. with extinct volcanoes, among which stands Mount Shasta, 14,000 ft. The culminating point of the Sierra Nevada is Mount Whitney, about 14,500 ft., the loftiest non-volcanic summit of the United States outside of the district of Alaska. The continuation of this range northward into Oregon, Washington, and Canada is known as the Cascades, named from the many beautiful falls and rapids formed by the rivers in crossing this barrier.

The highest peaks are in Alaska. Mt. McKinley, about 20,500 ft. above sea level, is the highest summit in North America. Mt. St. Elias, 18,100 ft., was for a long time supposed to be the highest. A neighboring peak to this, in Canada, is Mt. Logan, whose altitude is variously put at 18,000 and 19,500 ft. There are a great number of very high peaks throughout the system. Forty peaks in Colorado alone exceed 14,000 ft., and 200 exceed 13,000 ft. elevation. Pike's Peak in the Front Range is the most famous mountain of the Great Plains border.

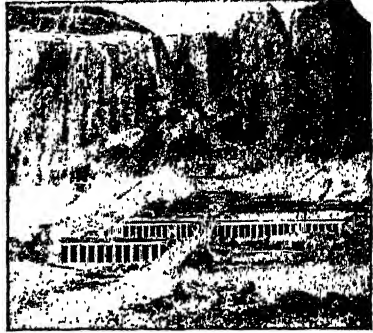
Several of the most striking single mountains are extinct volcanoes. Mt. Hood, 11,255 ft., and Mt. Rainier, 14,526 ft., are especially good examples. Structurally the ranges differ widely. The Basin Ranges are chiefly great fault blocks. The eastern ranges, such as the Rocky Mountain Front Range, exhibit a granite core representing an upward folding. The Uintas are broad folded and faulted sediments much dissected by erosion. The Sierra Nevada are closely-folded schists and have also volcanics. And the Coast Range resembles the Appalachian type of folding. Rocks of all ages are involved, but the chief mountain-making movements date back only

to the Tertiary period of geologic time.

Rocks of almost all types occur including igneous, sedimentary, and metamorphic classes. The chief mineral resources are gold, silver, lead, copper, and coal, and many others are produced. The immense metallic wealth discovered in these ranges has been one of

leys are called parks, especially in Colorado, and the bounding mountains are known as the Park ranges. The Yellowstone National Park in N. W. Wyoming has been made a reservation (see YELLOWSTONE NATIONAL PARK).

Many of the valleys are heavily glaciated,

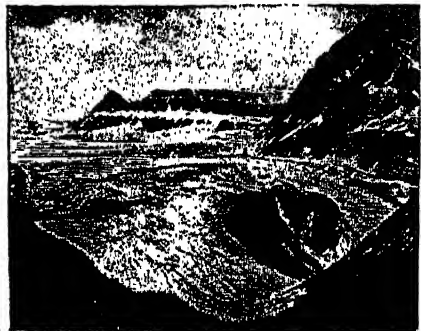


*Rock Temples.*

Left, Small temple at Abu Simbel, Nubia; Right, Deir-el-Bahari, Egypt.

the large factors in the development and prosperity of the United States for the past fifty years. This mountainous region is the source of almost all the large river systems of N. America. Erosion is everywhere a prominent feature. Great cañons are cut across the outer barriers by the main streams, and

and many glaciers, chiefly in Canada and Alaska, still exist. Many peaks have perpetual snow. Agriculture is profitable only in the valleys capable of irrigation, as a rule. But when governed in this way the soil is extremely fertile. The higher valleys and mountain slopes are grazing lands of great value.



*The Canadian Rockies.*

Left, Valley of the Peaks, Laggan, Alberta; Right, Yoho Glacier near Field, B. C.

some of these are among the most noted in the world. Such is the Grand Cañon of the Colorado, in Arizona and Utah, where almost horizontal strata are cut to a mile in depth by erosion. Picturesque gorges with falls of great height occur, such as the Yosemite in California and the Yellowstone in the National Park. The high inter-mountain val-

Mining, grazing, lumbering, and farming are the industries. Lumbering is confined largely to the Cascade and Coast Ranges. The greatest forest reserves in the U. S. remain in that region. The giant sequoias, among the largest trees in the world, are a product of the Sierra Nevada and Coast Ranges.

The first formal exploration of the Rockies

was by Lewis and Clark in 1804. Other early explorers were Harman, Long, Schoolcraft, Nicollet, Bonneville, Pike, and especially Frémont. Since 1840, numerous expeditions have been sent to this work, and at the present time the U. S. Geological Survey has parties in this field each year.

**Rocky Mountain Sheep.** See **Bighorn; Sheep.**

**Rod, or Pole, or Perch,** a unit of lineal measure, used in land-surveying, and equivalent to  $5\frac{1}{2}$  yards, or  $16\frac{1}{2}$  ft.

command of the army, he revolted in 708, and deprived him of the crown. Tarik, a Moorish chief, gave his aid to the sons of the deposed king, invaded Spain, and decided the fate of the Gothic monarchy by defeating Roderic in the battle of Guadalete, Roderic himself being among the slain.

**Rodez,** chief tn. of French dep. Aveyron, stands high on a river bluff, crowned by a noble Gothic cathedral (1274-1535). It is rich in houses of the 15th and 16th centuries. There are manufactures of woollens, serge,



*The American Rockies.*

Left, Marshall Pass, Mount Ouray; Right, Long Lake and Snowy Range, Near Ward, Col.

**Rodbertus, Johann Karl** (1805-75), German economist, the founder of scientific socialism, was born at Greifswald in Pomerania. Starting with the postulate that labor is the source of all wealth, Rodbertus believed that the natural effects of the operation of the existing economic laws will be to bring about eventually the realization of the ideal of state socialism, when land, capital, and the products of labor shall be national property. His views are laid down in *Zur Erklärung und Abhilfe der heutigen Kreditnot des Grundbesitzes* (1868), and other works.

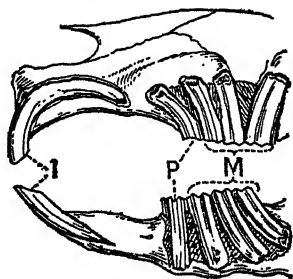
**Rodentia,** or **Gnawing Mammals,** the order which includes rats and mice, hares and rabbits, the squirrels, porcupines, beavers, and a number of other mostly small forms.

**Rodeo,** Spanish, literally a fair or market. In this country applied to the "wild west" show featuring exhibitions of riding, roping and steer-wrestling.

**Roderic** (d. 711), the last of the Visigothic kings on the throne of Spain. Having been entrusted by his sovereign, Witiza, with the

and straw hats. A Roman aqueduct (restored) still brings water to the town. It has been the seat of a bishopric since the 4th century; p. 16, 105.

**Rodgers, John** (1771-1838), American



*Teeth of Rodent.*

I, Incisors; P, premolars; M, molars.

naval officer, born in Hartford co., Md. After serving in the Mediterranean squadron in 1803 and 1804, he succeeded to the command of the squadron in 1805, and finally dictated

terms of peace to Tripoli and Tunis. Immediately on the declaration of war in 1812, Rodgers put to sea with a squadron capturing some valuable prizes, and in 1814 assisted in erecting batteries for the defence of Baltimore. He was acting secretary of the navy in 1823, and was in command of the Mediterranean squadron in 1824-27.

**Rodin, Auguste** (1840-1917), French sculptor and painter, was born in Paris. An impressionist in method, he was so keen a realist in execution that he was accused of having cast his *L'Age d'Airain* (in the Luxembourg, Paris) upon a living model. His remarkable and daring studies of the human figure developed his fine modelling of contours, the production of exquisite sincerity of line, the expression of rhythmic movement of the human form. His chief characteristic is his extraordinary power in the synthesis of psychic expression. His much-abused *Balzac* is not so much a statue of the man as an embodiment of the *Comédie Humaine*. His *Victor Hugo* is a presentment of the genius of the poet; and his *Kiss* is less the embrace of two people than the psychology of passion in the kiss. His intense belief that beauty is life, in whatsoever form, raises the most animalistic of his statues above the charge of coarseness. Each work produced was hotly discussed and abused—more than once the commission was withdrawn. Among his best known works are *The Thinker*; *Gate of Hell* and *The Pillar of Work*. Several of his works are in the Metropolitan Museum of Art and a Rodin Museum was opened in Philadelphia in 1929.

**Rodney, George Brydges Rodney, Lord** (1719-92), British admiral, was born at Walton-on-Thames. In 1780, having relieved Gibraltar, he proceeded to the W. Indies, and engaged the French under De Guichen; off Martinique. After capturing St. Eustatia in 1781, Rodney fought a great battle off the Saintes, and crushingly defeated the French under De Grasse in 1782. For this he was created a peer. In 1781 he had been appointed vice-admiral of Great Britain.

**Rodosto, or Bisanthe** (Turk. *Tekir-dagh*), tn., on Sea of Marmora, Turkey in Europe.

**Roebing, John Augustus** (1806-69), German-American civil engineer. He was born in Mühlhausen, Prussia, and in 1851 he designed the famous old Niagara Suspension Bridge, the first of the kind to carry railroad trains, which was completed in 1855. In 1867 he was appointed chief engineer of construction of the East River or Brooklyn suspen-

sion bridge, which was to eclipse entirely every work of its kind. He was author of *Long and Short Span Railway Bridges* (1869).

**Roebing, Washington Augustus** (1837-1926), American civil engineer, son of John A. Roebing. He constructed a suspension bridge over the Rappahannock river, and one over the Shenandoah river at Harper's Ferry. In 1869 he assumed his father's position as supervising engineer of the Brooklyn bridge, and successfully completed it in 1883.

**Roedeer** (*Cervus capreolus*), a small species of deer which is widely distributed throughout Europe and extends into W. Asia. It is indigenous in the British Isles, but as a wild animal is now very rare. The roe is essentially a forest animal, whereas the open hillsides are the natural haunt of the red deer.

**Roerich, Nicholas Constantinovich** (1874- ), Russian painter, formerly a leader in the Moscow Art Theatre and the Diaghilev Ballet, came to America in 1920 and resided for a time in New York City. He is well known for his works for the theatre which include the scenery for *Prince Igor*, and the libretto for Stravinsky's *The Rite of Spring*, for which Roerich also designed the scenery and the costumes. He spent 5 years painting in Central Asia, and has painted a total of over 3,000 pictures. The Roerich Museum, 310 Riverside Drive, New York City, contains 1,006 of his works. He has published several books including *Himalaya* (1926); *Maitreya* (1932).

**Roeskilde, or Roskilde, tn., isl. Zealand**, Denmark, at head of fjord of same name; has a fine 11th-century cathedral, containing tombs of Danish sovereigns. It was often the capital of Denmark before 1443. By the treaty of Roeskilde, 1658, Denmark transferred to Sweden her possessions beyond the Sound; p. 13,540.

**Rogation Days**, the Monday, Tuesday, and Wednesday before Ascension Day, which are appointed for prayer and abstinence. The Sunday before is called Rogation Sunday. The rogation days are now observed to seek God's blessing upon the land and its fruits.

**Roger I.** (1031-1101), count of Sicily, was a native of Normandy. In 1072 he succeeded in wresting Sicily from the Saracens, when he was invested by his brother, Robert Guiscard, with the sovereignty of Sicily, under the title of count. On the death of Robert (1085) he succeeded to his possessions in S. Italy.

**Roger II.** (1098-1154), king of Sicily, was

the son and successor of Roger I., count of Sicily. He took arms against Pope Innocent II., whom he made prisoner in 1139; but the latter, by recognizing Roger as king of Sicily, obtained his liberty. Roger made conquests in Africa and Greece, and from the latter country introduced into Sicily the silkworm and the mulberry tree.

**Roger de Coverley, Sir**, one of the members of the imaginary club under whose direction the *Spectator* was professedly edited. The conception and first sketch of Sir Roger were due to Steele, although Addison gained immortal glory in filling up the character.

**Rogers, Robert** (1727-c. 84), American soldier, frontier fighter, and Loyalist, born at Londonderry, N. H. During the French and Indian War he raised and commanded a body of men called 'Rogers Rangers,' which proved invaluable to the English commanders in all the campaigns of the war, acting independently most of the time. He was with Wolfe at Quebec in 1759, and later in the year destroyed the Abenaki stronghold in Maine. In 1760 he assisted Amherst in the Montreal campaign, and after its capitulation was sent up the lakes to secure the surrender of the western posts.

**Rogers, Will** (1879-1935), humorist and cowboy actor, was killed in an airplane accident which also took the life of his holiday companion, Wiley Post, round-the-world flyer, on August 15, 1935, near Point Barrow, Alaska. Rogers was born in the old Indian Territory (now the state of Oklahoma) and attended a military academy in Missouri. He rode the range in his youth, traveled widely and he began a stage career at Hammerstein's Roof Garden, New York, in 1925. His quaint humor made him nationally famous and at his death he was ranked with Twain and Artemus Ward. He wrote a column which appeared in more than 200 newspapers every day, and after successes in the Ziegfeld Follies appeared in moving pictures and gave weekly radio talks.

**Rogers, William Barton** (1804-82), American scientist. He was born in Philadelphia, and graduated at William and Mary College, Jamestown, Va., 1822. In the following year he was appointed professor of mathematics in the college and retained the position until 1825. In 1860 he submitted plans to a Committee of Associated Institutions of Science that was considering the advancement of scientific instruction, and these plans in the following year became the basis

of the famous Massachusetts Institute of Technology. In 1862 he was elected first president of the institute, which, however, was not opened for instruction until 1865. From 1865 to 1868 Professor Rogers filled the chairs of physics and geology in the institute. He was founder of the American Association for the Promotion of Social Science, and president of the National Academy of Science (1878). His *Life and Letters*, edited by his wife, was published in 2 vols., 1896.

**Rogier, Charles Latour** (1800-85), Belgian statesman, was born at St. Quentin, France. From 1861 to 1868 he was president and foreign minister.

**Roget, Peter Mark** (1779-1869), English physician and lexicographer, was the compiler of a *Thesaurus of English Words and Phrases*, on which he spent nearly fifty years.

**Rohan**, an ancient Breton family, descended from the Dukes of Brittany. The most important members were René, Vicomte de Rohan (1550-86), one of the most valiant captains of his time, and Henri, Duc de Rohan (1579-1638), leader of the Huguenot party in France during the reign of Louis XIII. He wrote admirable *Mémoires*.

**Rohillas**, a race of Pathan horsemen, who came from Afghanistan and conquered the rich province to which they gave the name of Rohilkhand. In 1774 they were driven from Rohilkhand by the East India Company and the nawab wazir.

**Rohlf, Anna Katharine (Green)** (1846-1935), American author, born in Brooklyn, N. Y., the daughter of James Wilson Green of that place. Her family early removed to Buffalo, N. Y. Her first published book, *The Leavenworth Case*, attracted wide attention for the ingenuity of the plot. Among many other novels, all detective stories, were *The Mystery of the Hasty Arrow*, 1917; *The Step on the Stair*, 1922.

**Roland**, paladin of Charlemagne, fell Aug. 15, 778 at Roncesvalles in the Pyrenees after conquering Spain n. of Ebro, except Saragossa. He became the hero of the national epic of France, comparable to the *Mort D'Arthur*, *Cid*, and *Nibelungenlied*. The *Chanson de Roland* was the poem chanted by Taillefer at Hastings (Wace, *Roman de Rou*).

**Rolfe, John** (1585-1622), English colonist, husband of Pocahontas, b. in Norfolk. He came to Virginia in May, 1610, having sailed in the ship with Sir George Somers, June 8, 1609, and having spent a year at Bermuda, where they were shipwrecked. He became a

leading planter, is said to have been the first colonist to begin the cultivation of tobacco, and in April, 1613, was married to Pocahontas, whom he took to England in 1616. He returned to the colony in 1617 as secretary, Pocahontas having died in England. He was a member of the council in 1619.

**Roller** (*Coracias garrulus*), a bright-plumaged bird, in which the sexes are alike in plumage, which is chiefly shades of blue, except for the brown back. The bird reaches a length of twelve inches, and is remarkable

**Rolls, Hon. Charles Stewart** (1877-1910), English pioneer aviator, was born in London. He competed in many motor car races, but he is best remembered by his achievements as an aviator.

**Rolvaag, Ole Edvart** (1876-1931), Norwegian-American writer, emigrated to America at the age of 16 and became professor at St. Olaf's College, Minnesota. His novels of pioneer life include *Giants of the Earth*, *Peder Victorious*, *His Father's Son*. He was decorated by the Norwegian king, 1926.



Statue by Rodin—'The Thinker'.

for the curious antics performed by the male in the breeding season.

**Rolland, Romain** (1866- ), French author and dramatist; wrote *Jean Christophe* and *L'Ame Enchantée*; also a biography of Beethoven. Awarded Nobel Prize, 1915. He introduced history of music at the Sorbonne.

**Rolling Mills**, machines for reducing the ingots of steel or 'piles' of wrought iron into sheets, plates, bars, rails, angles or other sections. These machines were invented in 1783 by Henry Cort, an Englishman, who also invented a process of 'puddling' iron. There are special forms of mills for rolling tires, rods, and tubes.

**Romagna**, district, Italy. Known in the middle ages as *Romania* or *Romandiola*, it formed a part of the exarchate of Ravenna. It was annexed to Italy in 1860.

**Romaic**, a term for the popular Greek dialect developed before the fall of the Byzantine empire, essentially similar to the modern Greek tongue as now spoken.

**Roman Architecture.** Of the early architecture of Rome and the other Latin cities comparatively little is known; the remains of early Italian architecture consist of a few arches and sepulchral monuments. With the conquest of Carthage, Greece, and Egypt, the Romans became acquainted with the arts of

those countries, and by degrees endeavored to use them for the embellishment of the imperial city. Rome under the empire was the capital of the world, and attracted artists from every country. The result was that the architecture of Rome became a mixed style.

**Roman Catholic Church**, or the **Holy, Catholic, Apostolic and Roman Church**, the largest of three great divisions of Christendom, namely Roman, Greek, and Protestant, defined by its own theologians as 'a body of men united by the profession of the same Christian faith, and by participation in the same sacraments, under the governance of lawful pastors, more especially of the Roman Pontiff, the sole vicar of Christ on earth.'

According to this definition the church is essentially a visible body. Roman Catholic theologians, however, distinguished between the body of the church and the soul of the church, the former being the visible organization established by Christ as the divinely appointed means of salvation, the latter embracing all Christians who are in good faith, and who have thus the indwelling of the Holy Ghost without which no man can be saved.

The Attributes of the Church, as taught by its leaders, are three: Authority, or the right and power of the Pope and the bishops, as successors of the apostles, to teach and to govern the faithful; infallibility, or the impossibility of error on the part of the Church in matters of faith and morals; and indefectibility or the power of the Church to endure to the end of the ages.

The principle of the authority of the church is based upon the divine commission to the apostles to 'teach all nations,' to offer sacrifice, and to govern the flock of God, as well as upon other explicit statements of Christ. The infallibility of the Church is likewise supported by Christ's own statement, 'I will ask the Father and he shall give you another Paraclete, that he may abide with you forever, the Spirit of Truth.' The third attribute of the church—infecibility, includes not only its persistence to the end of time but also its preservation from corruption in the sphere of faith and morals and assurance against loss of the hierarchy or the sacraments. In its support is cited Christ's promise: 'The gates of Hell shall not prevail against it.' Those external signs by which the church may be distinguished from all heretical or schismatic bodies, are four, and are summed up in its claim to be the 'one, holy, catholic, and apostolic church.'

The chief laws which the Church of Rome has made binding on all her members are: 1. The observance of Sundays and holy days of obligation by hearing Mass and resting from servile works; 2. fasting at prescribed seasons and on certain days, also abstinence from flesh meat on Fridays; 3. annual confession and communion, the latter at Easter time; 4. the prohibition of marriage within certain degrees of kindred and at forbidden times; 5. an absolute fast from midnight before reception of communion, except in danger of death, when the sacrament is administered as a '*viaticum*.' Besides these general laws, there are others binding on the clergy, the principal of which are: The obligation of celibacy, commencing with subdeaconship; and the daily recitation of the canonical hours contained in the breviary.

The form of worship is highly ritualistic. It is embodied in the Missal, or Book of the Mass, and the Breviary containing the Divine Office or prayer which all priests are obliged to recite daily in the name of the church on behalf of her children. The sacraments of the church are seven: Baptism, which is performed as soon after birth as possible, by sprinkling, and which is held to be necessary to salvation; confirmation; penance, entailing confession of sin on the part of the penitent and the granting of absolution by the priest; the Eucharist or Holy Communion; extreme unction or the last anointing administered to persons in danger of death; Holy Orders, by which ministers of the church are ordained for their sacred duties; and matrimony.

The principal sacramentals are the sign of the cross, expressing the mysteries of the unity and trinity of God; holy water blessed with the prayers of the church; holy oils; blessed candles; blessed ashes placed on the forehead on Ash Wednesday to bring to mind the spirit of penance appropriate to the Lenten season; blessed palms; images of the Virgin and the saints; rosaries, and scapulars.

At the head of the governing body of the Roman Catholic church, usually known as the hierarchy, is the Pope, in whom is vested 'the whole fulness of supreme power, ordinary and immediate, over all and each of the pastors and the faithful.' He is assisted by the Sacred College of Cardinals, and by several Sacred Congregations or permanent ecclesiastical committees, of which cardinals are the chief members; by archbishops, and bishops; by the apostolic delegates and vicars, and by certain abbots and other prelates.

The history of the Roman Catholic Church divides itself naturally into three periods. The first period extends to the time of the Great Schism of the ninth century, and is marked by the foundation of the church by the Apostles and by the development of those fixed standards of ecclesiastical life with which is bound up all its later history. The earlier part of this period was an era of persecution. The second era of the church's history is marked by the wide extension of its activities among the Celtic and Teutonic nations of Northern and Central Europe, and by the Great Schism, whereby the Greek Church withdrew from the Roman communion. The modern period of Roman Catholic history begins with the Protestant Reformation by which whole nations separated themselves from the Roman communion, and the Council of Trent (1545-1563), redefining Catholic doctrines.

The historic beginnings of the Catholic Church in the New World are almost coincident with the discovery of the continent, for as early as 1493 twelve priests accompanied Columbus on his second voyage of exploration. The first episcopal see erected on the American continent was that of San Domingo, which was created in 1513. The second American see was that of Santiago de Cuba in 1522; next came the see of Mexico in 1530. From these centers went forth the missionaries who first preached the Gospel to the natives of the southeastern and southwestern portions of the territory now occupied by the United States. During the same period French missionaries were preaching the Gospel on the banks of the St. Lawrence, in Maine, and Northern New York, and even penetrating into the region of the Great Lakes and the Valley of the Mississippi. The first Catholic church in New York City was St. Peter's, built in 1785. St. Patrick's Cathedral, Fifth Avenue at 51st Street, was begun in 1858.

The See of Baltimore was created in 1789, and its first bishop, John Carroll, was consecrated Aug. 15, 1790. The growth of the Catholic Church in the United States during the nineteenth century was exceedingly rapid, owing chiefly to the great tide of immigration. In 1790 there were about 30,000 Catholics in the thirteen colonies; in 1870 there were about 5,000,000 in the U. S.; in 1939, about 20,700,000. The world total is estimated at about 330,000,000. The Catholic population of the New York archdiocese, which includes Manhattan, the Bronx and Richmond in the City of New York; and the

counties of Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester in New York State, is about 1,000,000. The diocese of Brooklyn numbers about 1,100,000, and that of Newark, N. J., about 750,000.

In 1929 the Lateran Treaty marked the resumption of cordial relations between the Vatican and the Kingdom of Italy, which had been suspended some sixty years. This treaty, made during the pontificate of Pius XI. and while Mussolini was head of the Italian government, restored the Pope's temporal power over Vatican City, and he again became an independent sovereign.

In 1933, a radio broadcasting station was inaugurated at the Vatican, with an address to the world delivered by Pope Pius XI.

The year 1939 saw the death of Pius XI. and the elevation to the papacy of Cardinal Eugenio Pacelli, as Pius XII. By the death of Cardinal Hayes of New York in 1938, and of Cardinal Mundelein of Chicago in 1939, the United States lost two of its four Cardinals. The new Pope continued the policies of his predecessor in attempting to prevent Europe from another great war.

**Roman Catholic Emancipation.** See **Catholic Emancipation.**

**Romance.** The word *roman* meant originally nothing more than a literary composition written, not in Latin, but in some of the vernacular tongues derived from Latin, especially French: for instance, the prose chronicle of the crusades by William of Tyre, being written in French, and happening to mention the name of the Emperor Heraclius early in its text, was known as *Le Roman d'Eracles*. But as probably the largest and certainly by far the most popular part of vernacular literature during the twelfth and thirteenth centuries consisted of adventurous stories—sometimes in prose but rather more commonly in verse—the connotation of the name was gradually adjusted to its denotation, and the original sense was entirely merged in the secondary.

The kind of style which we call romance is not absent from the literature of the Greeks and Romans, but it is not largely present there. To all intents and purposes the *Odyssey* is a romance. Only at the confines of the classical period do we see something like romantic traits. These in Petronius may be due to the old Italic spirit forcing itself up at last through Greek culture; but in Lucian and Apuleius it must certainly be taken in connection with Asiatic and African influences, and these influences also appear in the



interesting group of 'Greek romances' which are scattered over the centuries (from fourth to twelfth). The qualities thus sparsely visible reappear in mediæval literature unmistakably.

The classic limitations of unity, measure, and so forth were certainly attended to in most epic poems by the poets; it was a rule laid down that nothing should be left totally unexplained, and that nothing should happen without some connection (if it were only that of episode) with the main plot. In romance all this was changed. Christianity itself not merely supplied a mythology much more resembling these other religions than the official paganism of Rome, but gave the most powerful assistance to the supernatural atmosphere of romance by its attitude toward the one and the other.

Again, the strictly critical spirit was almost dormant in the middle ages; and the romance, as such, was written not according to rule, but merely to please. If the adventures were exciting, the descriptions brilliant, the hero and the heroine attractive, what more could be wanted? War maintained, with necessary changes, the claims it had exerted on the ancients, and religion immensely increased them. It is not quite certain even that saints' lives are not the earliest examples of rudimentary romance, as we have them in the vernaculars, and earlier still in Latin.

But the third great theme which, though it could not be kept out entirely, had been snubbed and kept down in antiquity—the theme of love—received an extension greater still, and always increasing as time went on. It became the invariable (and too often trivial) motive of the later romances of adventure. In fact, the typical mediæval romance may be said to be a love story diversified *ad libitum* by episodes of adventure, and dominated by the religious note, which often, though not always, shades off into semitones of outer and vaguer superstition.

It could require no extraordinary originality to perceive that narrative of this sort might be adapted to less serious subjects and yet retain its interest of adventure. The extreme beauty of some of these stories, and the story interest of all but the dullest, could not fail of their effect; and the charm of story-telling once exercised, the reflection that it might be enjoyed for work day as well as Sunday use could not fail to follow.

There seems to be little if any doubt that the first remarkable examples of the completed product of the typical romance of love.

adventure, and (mainly religious) mystery are found in connection with the legend of King Arthur, of the Knights of the Round Table, and of the Quest for the Holy Grail. It is remarkable that no single romance ever incorporated the whole or even any very considerable part of this group of legends, the best-known record of it in England, the *Morte d'Arthur* of Sir Thomas Malory, being a fifteenth-century compilation from various originals, from before 1200 to Malory's own time.

The most numerous class of romances deals with the adventures of individual knights, and (in somewhat less number) ladies, whose course of true love or rightful heirship is interrupted by fate or human wickedness, but who invariably triumph, and generally marry, at the end. Of these, the most famous and popular, though by no means the best of literature in any form that we possess, were probably the stories of *Sir Guy of Warwick* and *Sir Bevis of Hampton*. All of these but two or three at most are of substantive interest; and it has sometimes been thought that four of the best of them—*Seven Wise Masters*, *Arthur and Merlin*, *Alexander*, and *Richard Cœur de Lion*—are the work of a single though unknown hand.

Still later is the lovely fairy story of *Sir Launfal*, written (or rather rewritten) by a known person, Thomas Chester, early in the 15th century. Almost all that can be said against the poorer specimens of the common run of romances has been put with extraordinary felicity and admirable wit by Chaucer in *Sir Thopas*—the conventional beauty and valor of the knight, his determination to fall in love with somebody very lovely, very exalted, and very difficult of attainment, the haphazard geography and etceteras of the story, the vain repetition of detail, the giants and evil beasts that get in the hero's way. Other faults are the extreme long-windedness of some of the romances, the intolerable amount of mere catalogue description, the inevitable tendency of all recited work to cliché repetition of stock phrase.

Really brilliant phrase, the 'gold dewdrops of speech,' for which Chaucer himself was so justly praised, was but seldom achieved by any one save himself and Dante and a few others before the end of the 14th century; while dramatic representation of character is almost unknown throughout the middle ages. Thus the romancers constantly miss 'psychological moments,' of which classical or modern poets would avail themselves eagerly

and to their utmost. In the latest romances of all, and in a few of the earlier, the 'conjuror's supernatural'—a blend of witch and giant and so forth—is overdone quite *ad nauseam*, and ends by debasing the poetical to or below the level of the puerile.

Despite all this, we may assert for romance a very great place indeed in the literature of the world. Its great title is that it added a new way of literary pleasure. The peculiar charm of romance is not susceptible of ultimate analysis: it ends, like all other such things, in a mystery—in an appeal to feeling.

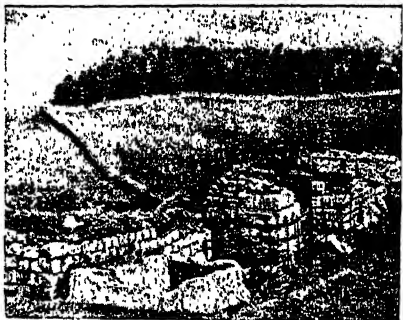
We have illustrated the characteristics of romance chiefly from English examples, but they are not very different either in the French or in the German. The greatest known writer of the accomplished romance itself is Chrétien de Troyes, in the later 12th century, a poet to whom some would assign the main, and to whom all must assign a large, part in the development of the Arthurian story. The Germans were particularly fortunate in possessing writers of very great talent, who devoted themselves to the task of naturalizing the French romances—Gottfried of Strassburg, author of the most poetical version we possess of the *Tristram* story; Hartman von der Aue, author of the exquisite *Der Arme Heinrich*, which furnishes the subject of Longfellow's *Golden Legend*; and above all Wolfram von Eschenbach, one of the chief of mediæval poets, who worked out the mystical side of the Grail legend in his poems of *Parzival* and *Titurel*. Italy probably had not a little early work of the *chanson de geste* kind, though only the invaluable *Poema del Cid* remains to us.

**Romance Languages**, the modern European languages derived from Latin, the speech of the ancient Romans. They are developed from the ordinary colloquial Latin of the middle ages. Not including local dialects, the following are the Romance languages: Italian, French, Provençal, Spanish, Portuguese, Roumanian, and Rhæto-Romanic, or Rumonsch. Provençal is the speech of Provence, the southeastern part of France, known to the Romans as the *Provincia par excellence*. Apart from changes in the form of words, the Romance languages differ from Latin mainly in being much more analytic—in using auxiliary verbs instead of changes of form to signify variations of person, tense, mood, and voice, and in using prepositions instead of cases in nouns. They all contain non-Latin

elements in their vocabulary in varying proportions.

**Roman Empire, Holy.** See **Holy Roman Empire**.

**Roman Law.** A body of law, sometimes known as the Civil Law, developed by the ancient Romans. Religious customs undoubtedly had a great influence in its origin and early development. Probably the first systematic codification of the secular laws of Rome was the famous Law of the Twelve Tables, about 450 B.C. Other codifications were attempted, but the great works of Justinian, about 529-534 A.D., including the



*Roman Remains in England.*

Upper, Uriconium, Wroxeter; Lower, Gateway to Roman Camp, Borcovicus, Northumberland.

*Institutes*, *Digest* or *Pandects*, and the *Codex*, were the most authoritative, and the great source of legal knowledge for centuries. The Code Napoleon, a compilation of the Roman law as developed in France, is the basis of the Louisiana Code, and of the codes of most of the South American states.

**Roman Literature.** See *Latin Language and Literature*.

**Roman Remains in Great Britain.** Great Britain, except for the small portion lying n. of the river Tyne, was for many generations an integral part of the Roman empire. In the southern parts of the island, a complete network of highways or 'streets' testify to the settled condition of the country during the Roman occupation.

The relics of Roman London can be studied in the British Museum and at the Guildhall;

among the many evidences that the citizens of Silchester led a refined and often a luxurious life. Throughout Roman Britain the same high degree of civilization is everywhere manifest. Everywhere the dwellings of the upper class were warmed by hypocausts beneath the flooring of the rooms. Also there were baths (supplied by lead pipes), ovens, and other comforts. Consult Conybeare's *Roman Britain*; Haverfield's *Roman Britain* (1906).

**Romans, Epistle to the,** the first of the epistles of St. Paul as they appear in the New



*Mussolini Reviewing Troops.*

while portions of the city walls and of the Tower mark the site of the old Roman fortifications. But the Silchester relics in the museum at Reading furnish the best representation of life in a Roman-British city. The city was surrounded by a wall nearly two miles in circumference and nine ft. thick, as well as by a fosse. Beside the forum stood a large basilica, 325 ft. in length by 125 ft. in breadth, and there is also the foundation of what is believed to have been a Christian church. Huge wine jars, of a kind used for holding the vintages of Spain and Italy, amphoræ, Samian ware, rings, and other personal ornaments, and ladies' safety pins, are

Testament. It is addressed to 'all that are in Rome' and deals chiefly with the problem, How shall a man become righteous before God? Paul's answer is: By personal appropriation of and surrender to God as manifested in the perfect yet ever-continuing work of Jesus Christ—i.e., by faith.

Though the epistle is not a scientific treatise, but a true letter, it is rightly regarded as one of the fundamental bases of Christian theology. The Epistle to the Romans was probably written at Ephesus, shortly after 1 and 2 Corinthians (c. 56-58), and was conveyed to Rome by Phœbe, a deaconess. Consult numerous *Commentaries*.

**Romanticism**, a term somewhat loosely used and difficult of definition, but in general meaning the reproduction in modern art or literature of the life and thought of the Middle Ages. The great critic, Walter Pater, says that the terms classic and romantic do not describe particular periods in literary history so much as certain qualities and tendencies running through the literature of all times and countries. As at present understood, the term romanticism faces in two directions. As it earlier opposed its novelty, its freedom and lawlessness, its strange beauty, to the classical respect for rules, conventions, and precedents, so now its discontent with existing conditions, its idealism, and mysticism are opposed to the realist's adherence to fact.

Perhaps the most important title in the history of English romanticism is Thomas Percy's *Reliques of Ancient English Poetry* published in 1765. Among the many illustrious names which adorn this period are those of Chatterton, Byron, Wordsworth, Scott, Crabbe, MacPherson, Cowper, Coleridge, and Burns. In Germany the movement manifested itself in the transcendentalism of Kant, in German pietism, and in such writers as Goethe, Novalis, Schiller, Richter, Fouqué and Hoffman. The great apostle of romanticism in France is Victor Hugo. A large and brilliant galaxy of names surrounds him, among them De Musset, Lamartine, Gautier, George Sand, Dumas, Chateaubriand, Rousseau, Sainte-Beuve, and Flaubert. Consult Beers' *English Romanticism in the Eighteenth Century*; Maar's *Modern English Romanticism* (1924).

**Romany.** See *Gypsies*.

**Romblón**, pueblo, Philippine Islands, capital of Romblon prov., 167 m. s.e. of Manila. It has a completely landlocked harbor; p. 10,467.

**Rome**, the capital of the ancient world and, since 1871, of the kingdom of Italy and of the prov. of Rome; p. 1,349,000. It is on the Tiber, about 22 m. from its mouth. The river divides the city into two unequal parts, the more important lying on the eastern or left bank, from which rose the famous 'Seven Hills' of Rome. The climate is fairly good in winter but oppressive and humid in summer.

Modern Rome is distinguished for its historic ruins, its many monuments, statues, gates, fountains, public buildings, and famous churches. The city is enclosed by a circle of detached forts and by a wall pierced by 13 gates. Twelve bridges span the Tiber in or near the city, several of them of great an-

tiquity. The oldest is the Ponte dei Quattro Capi built by Fabricius in 62 B.C. The Ponte Sant' Angelo, with its five arches, leading to the Vatican, is the best known.

For purposes of description, the city may be divided into four sections: 1. the n. and northeastern hills; 2. the district on the left bank of the Tiber; 3. the district to the s.; and 4. the district on the w. or right bank of the river. The northern and northeastern section comprises the Pincio, Quirinal, Viminal, and Capitoline Hills. In ancient times the Pincio was covered with parks and gardens, and the Quirinal was the home of the Sabine settlement. At the extreme n. is the Porta del Popolo, at the beginning of the Via Flaminia, which connects Rome with Tuscany. This northern district contains the church of Santa Maria del Popolo; the Fontana di Trevi, the finest public fountain in Rome; and the Villa Medici, erected in the sixteenth century and since 1800 occupied by the French Academy of Art. In its eastern part is the Piazza di Spagna, around which centers the foreign life of the city. To this square, from the Pincian Hill, descends the famous Scala di Spagna, with its 137 steps. Leading from this section of the city to the Piazza Venezia, which may be said to be the center of Rome, is the broad busy thoroughfare known as the Via Nazionale, the most important street in modern Rome. On it stand the Gallery of Modern Art and the Palazzo Colonna. A little to the s.e. is the church of Santa Pudenziana, said to be the oldest church in Rome, erected on the spot where St. Pudens and his daughters, who entertained St. Peter, are said to have lived. Still farther e. rises the imposing edifice of Santa Maria Maggiore, the largest of the churches in Rome dedicated to the Virgin.

The second district, that part lying next the Tiber on the left bank, extends from the Quirinal and Capitoline Hills to the river. During the Middle Ages and the following centuries it was almost the only inhabited quarter of the city and is still the most densely populated. It has many narrow crooked streets, but contains numberless points of interest. The main thoroughfare is the Corso, officially known as Corso Umberto Primo, and continued outside the city to the n. as the Via Flaminia. The Corso is nearly a m. in length; about half way in its course is the Piazza Colonna, one of the busiest squares in Rome, in the center of which rises the Column of Marcus Aurelius (95 ft.). Farther to the s. is the Palazza Sciarra Colonna, the finest of

the many palaces lining the Corso; at its termination is the imposing Palazzo Venezia, begun in 1455 and built of stones obtained from the Colosseum. Near the Palazzo Venezia is a huge monument to Victor Emmanuel II., begun in 1885 and finished in 1912. It consists of colonnades and steps surmounted by an equestrian statue of the king and is richly adorned with mosaics and paintings.

Northwest of the Piazza Venezia is the Palazzo Doria, one of the most magnificent in Rome, with a notable collection of paintings; n. of this is the Palazzo Colonna with a picture gallery; and still farther n.w., near the Tiber, is the Palazzo Borghese with a beautiful colonnaded court. The church of Santa Maria Rotonda, known as the Pantheon, not far from the Piazza Colonna, is the only ancient building in Rome still in good preservation. Other noteworthy features in this section of Rome are the University; the various government offices; the Palazzo della Cancelleria, a fine Renaissance building with a beautiful court; the Palazzo Farnese, built of material taken from the Colosseum and the Theatre of Marcellus; the ruins of the Theatre of Marcellus, begun by Cæsar and completed by Augustus; and the Porticus of Octavia, erected by Augustus and dedicated to his sister.

The third section of Rome comprises the southern portion, beginning with the Capitol and containing the Capitoline, Palatine, Aventine and part of the Esquiline Hills. In the time of the empire it was the most important part of the city, but has now lost much of its characteristic appearance owing to new and ill-advised construction. The Capitoline Hill is approached by a magnificent staircase, which leads to the church of Santa Maria in Araceli, crowning its summit and occupying the site of the ancient Capitoline temple of Juno. The square of the Capitol was designed by Michelangelo. Southeast of the Capitoline Hill, between the Palatine and Esquiline, lie the remains of the once magnificent Roman Forum. Conspicuous among these ruins is the Colosseum. South of the Colosseum stands the Triumphal Arch of Constantine, one of the best preserved structures of its kind in Rome. Of the Forum of Trajan there still remains a marble shaft, known as Trajan's Column. The Palatine Hill was the site of the Roman Quadrata. In the days of the republic it was occupied by private dwellings, including palaces. The Aventine, once the home of the Roman 'plebs,' is now chiefly covered with vineyards and

monasteries. The section known as the Lateran lies s.e. of the Colosseum. Here are churches and the Lateran Palace, in which the popes resided from the time of Constantine until 1300, and which now contains the Museum Gregorianum Lateranense, founded in 1843.

The fourth section of the city comprises the quarters lying on the w. bank of the Tiber. In the n. is the Borgo or Vatican quarter and in the s. is the Trastevere, with the Via della Lungara between. The chief ancient structure in the Borgo is the Castel Sant' Angelo, the tomb of Hadrian. West of the Castel Sant' Angelo are the church of St. Peter and the Vatican. The Trastevere is the home of the working class. In this section are the churches of Santa Maria in Trastevere, rebuilt in the twelfth century, Santa Cecilia in Trastevere, the legendary home of St. Cecilia, and San Pietro in Montorio, on the traditional site of St. Peter's crucifixion. A fine view of Rome is afforded from the piazza in front of San Pietro in Montorio. South of Rome are the Catacombs, the burial places of the early Christians; to the n. is the Villa Albani with a good art collection. The Via Appia which leads s. from Rome, a famous ancient highway, is now transformed into a modern street.

Industrially Rome is not important. Manufactures of art goods, as bronzes, cameos, ecclesiastical ornaments, and mosaics, and the making of copies of famous paintings are flourishing industries.

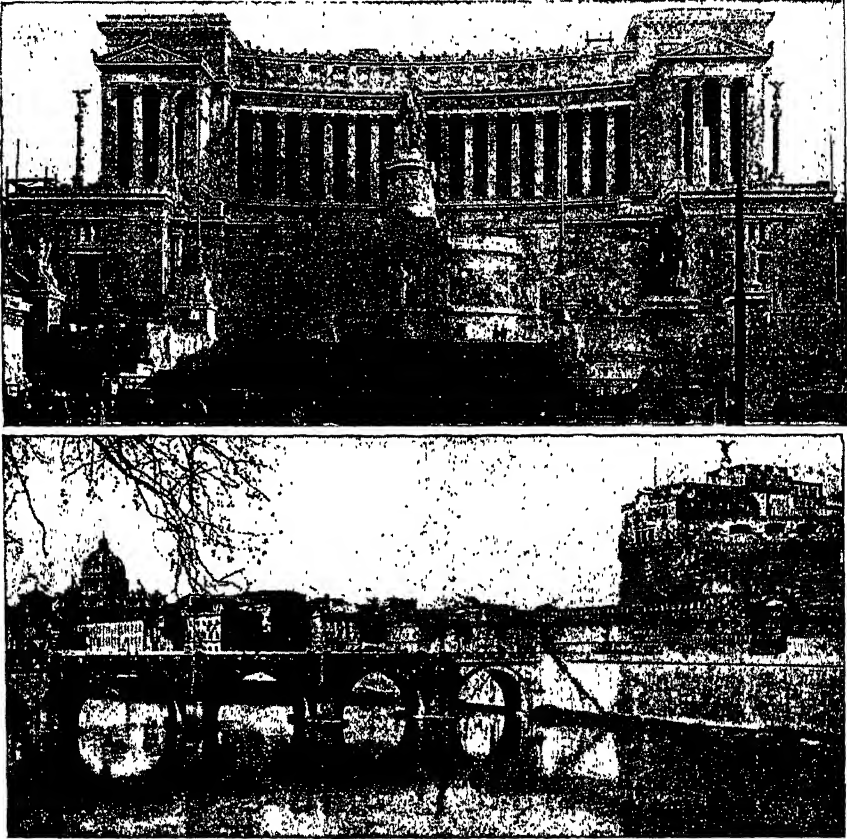
After the Allies invaded Italy, Rome was declared (Aug. 14, 1943) an open city.

*History of Rome.* 1. The Regal Period (753-510 B.C.).—The germ of Rome was a village on Mons Palatinus. Legend, tradition, and early festivals point to pastoral inhabitants coming from Alba Longa and other Latin towns, augmented by migrations. The evidence of language points to community of origin or early connection with Greeks. It is said that this village was first fortified by Romulus, who was regarded as founder of the city. To his reign (753-715) are assigned the formation of the senate, the introduction of Sabine inhabitants, and the first struggles with Fidenæ and Veii. Of subsequent rulers, Servius Tullius (578-534) built the first wall including the Seven Hills; he also divided the whole people into one hundred and ninety-three *centuries* for military service, and into twenty-one *tribes* for purposes of taxation. L. Tarquinius Superbus (534-510) extended Roman power beyond *vetus Latium*, fought

the Volscians, and founded various colonies in Italy. But his tyrannical conduct made him unpopular, and he was exiled.

2. The Republic (509-265 B.C.).—The Romans at the commencement of this period were arranged in *gentes* or clans, composed of families (*familia*), all supposed to be related and bearing the same name. The *paterfamilias* was the unit of Roman life; the heads of the

mitia centuriata of the Campus Martius, the *populus* expressed its will. The Upper House was the *Senatus* (originally composed of *senes*, old men of the patricians, the heads of the *familia*). It was also known as the Conscript Fathers. The senate solemnly conferred the sole executive power of the state on the king and afterwards on the consuls. The kingship, elective, conferred the powers of



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#### Rome.

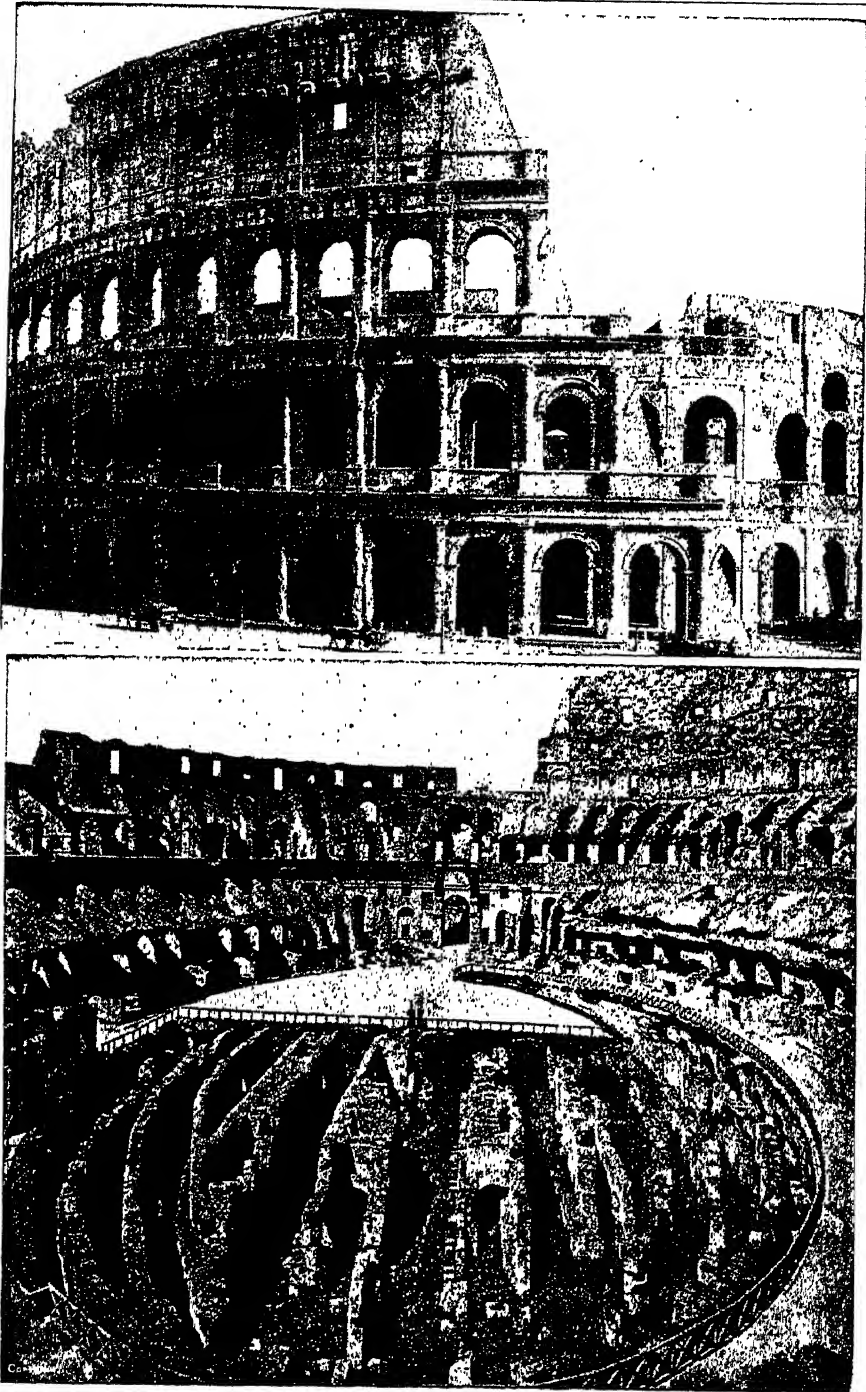
Upper, Monument to Victor Emmanuel and Tomb of the Unknown Soldier; Lower, Castel Sant Angelo (Hadrian's Tomb) and the Ponte S. Angelo Across the Tiber.

families of the original *gentes* formed the original patricians, their descendants, the great Patrician Order; *gentes* formed later consisted of the Plebes (originally 'the many'), who possessed no political rights until they won them under the early republic.

A popular assembly, the *comitia curiata*, assembled in the *comitium*, the Lower House; by it, and by the Servian institution, the co-

punishment and death, symbolized by the fasces or rods and axes borne before the Roman ruler by twelve lictors. The king (or the *inter-rex*) appointed his successor.

For over two centuries the history of Rome is chiefly the struggle of the patrician and plebeian orders. Poverty and the custom by which the debtor became the slave (*nexus* or *addictus*) of his creditor led in 494 to the



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*The Roman Colosseum: Exterior and Interior Views.*

secession of the plebeians to the Mons Sacer, where they threatened to establish an independent city. By the *Lex Sacrata* they obtained alleviation of their misery, and the right to appoint annually *tribuni plebis*, originally two, finally ten, in number, with power. The decemviri legibus scribundis drew up, in 451-450, the Twelve Tables of the Roman law, thus abolishing a great plebeian grievance—law, like religion, having been previously a mystery only to be known by patricians. The *Lex Canuleia* (455) legalized for the first time, marriage between patricians and plebeians.

The plebeians continued to gain concessions. In 326 *nexum*, by which defaulting debtors became at once slaves of their creditors, was abolished. In 304 Cn. Flavius published the *fasti* and *formulae* of lawsuits; in 300 the *lex Ogulnia* admitted plebeians to the colleges of pontiffs and augurs. About 275-266 the ædileship gave an *entrée* to the senate. All disabilities were now at an end, except that patricians could not be tribunes. In the intervals of these struggles Rome had been conquering Italy, and by 266 Roman authority extended from the Rubicon to Rhegium.

3. The Republic (265-28 B.C.).—The formation of provinces beyond the sea began with the Punic Wars. Commercial rivalry was the cause of these wars. The immediate object of the first war (264-241) was Sicily. At the end of the war, Sicily, except the kingdom of Syracuse, was made the first Roman province. Corsica and Sardinia followed. In the second Punic War (218-201), Sardinia was retained, and after ten years of fighting the Carthaginians were driven from Spain. Carthage had to surrender all ships of war, to evacuate Spain and all possessions beyond the frontier, and could offer no resistance to Roman expansion. The provinces were increased by the addition of the kingdom of Syracuse to Sicily, by the formation of two provinces in Spain, and by a protectorate over Numidia. Politically the effect of the war was to enhance the position of the senate, which, in the absence of the magistrates on service and at times of trouble, assumed many administrative functions. Indirectly also it led to an eastward expansion, Rome becoming supreme in Greece and Asia Minor after 189.

In 146, after a three years' siege, Carthage was destroyed, and her territory made into the province of Africa. The Roman exchequer gained so much from these conquests that citizens were no longer called upon to

pay the land tax (*tributum*), while great fortunes were made by companies of revenue collectors (*publicani*) and by bankers and money-lenders. Senators were debarred from these employments, which were therefore undertaken by *equites*, who thus formed a wealthy middle class. The governorships were also immensely profitable. How these opportunities were abused is shown by the fact that the first *quæstio perpetua* established was for trial of malversation by governors in the provinces (149).

The reverse side of the picture is the distress among agriculturists in Italy. The price of corn went down owing to importation from Sicily, Sardinia, and Egypt. Only large holdings paid. Small owners were bought out, free laborers supplanted by slaves, and the city was crowded with indigent people, thus forced from the land, while those who stayed were unable to compete with the great owners, who also held more than the legal amount of *ager publicus*, or fed more than the legal amount of cattle on it. Tiberius Gracchus proposed to reduce the holdings of this land to the legal standard, and to settle poor citizens on the surplus (133-131). Both he and his brother Gaius (123-121) perished by violence at the hands of the aristocrats. The proposals of Gaius aimed at curtailing the power of the senate by transferring the *judicia* to the *equites*. The poor were to be relieved by colonies, by distribution of cheap corn, by the shortening of the time by military service, and by giving the soldiers their arms and clothing. The bloodshed accompanying the fall of the Gracchi began the revolutionary era. A popular party arose, ready to go all lengths against the senatorial government and the monopoly of office by the great families. The struggle waged, the constitution of the republic resting in the power of first one and then another leader, leadership being determined by the fighting strength of a man's soldiers.

Finally, in 60, Pompey, Cæsar, and Crassus, the millionaire, joined in the informal coalition known as the 'First Triumvirate.' Pompey's *acta* were confirmed; Cæsar obtained the consulship for 59, and the provinces of Gaul and Illyricum for five years afterwards. But Cæsar's successes in Gaul alarmed the senate, and Pompey was gradually placed by it in a position to counterbalance him. Crassus perished at Carrhæ (53) and in spite of the renewal of the agreement in 56, whereby Cæsar had five more years in Gaul, Pompey and Cæsar gradually



became alienated. Pompey was resolved that Cæsar should resign his provinces before standing for the consulship in 48; Cæsar was resolved to enjoy the full term of office given him by law, and not to come home as a private citizen. Pompey was murdered in Egypt, in 48. For the rest of his life, however, Cæsar was in almost constant warfare, and could only partly carry out his large schemes of reform. On March 15, 44, he was assassinated.

A second triumvirate was formed in 43 by Antony, Lepidus, and Octavian, to last five years. Antony then went to Asia to govern the East; while Octavian returned to Rome to govern the West, Lepidus being allowed Africa. But Antony met Cleopatra at Tarsus, and falling under her influence followed her to Alexandria. There he shocked Roman feeling by seeming to wish to transfer the center of empire to Alexandria. In 36 Lepidus was deposed from the triumvirate, which had been extended to a second period of five years (37). Octavian's popularity grew as that of Antony decreased. He became to the Romans the guarantee of peace and safety. After more than one quarrel and reconciliation, the two men resolved on war. In 32 the senate formally deposed Antony from his command and declared war on Cleopatra. Defeated at Actium, both committed suicide in Egypt. At the end of the year 28 the newly devised constitution left Octavian Cæsar head of the state, with powers resting on decrees or plebiscita.

4. The Principate and Empire (27 B.C.-305 A.D.).—Octavian Cæsar now received the title 'Augustus' and *proconsulare imperium*, giving him practical command over all troops in Italy and the provinces. In 23 Augustus dropped the consulship, and received a confirmation of the *tribunicia potestas* for life, by which he henceforth dated the years. He secured peace in Italy, though there were several wars. From this time the history of the Roman Empire is that of her emperors. Among these emperors, Tiberius (14-27 A.D.), Caligula (37-41), Claudius (41-54), and Nero (54-68) depended on their armies for power. The Flavians (69-96) began with Vespasian, and attempted to restore the senate to its former power, to return to a simpler life, and to promote the general welfare of the people. Many of the emperors from about 200 to 300 were proclaimed by soldiers and later killed by them. From 268 to 284 (Claudius to Diocletian) there were some able emperors who put down pretenders and secured the frontiers, Britain being recovered,

Egypt reconquered, and the Persians forced to cede territory beyond the Tigris.

Constantine, in 323, ruling the empire alone, adopted the Christian religion, thus making it the state religion, and ending the severe persecution of Christians. However, Julian (360-363) attempted to supersede Christianity by a restoration of Hellenism. From about 370 A.D. the history of Rome was marked by a series of barbarian invasions. There was extreme poverty within the empire, the populace being drained by excessive taxation for the support of armies and the court. By 439 the Western empire had shrunk to Italy and Sicily and Sardinia. The next invasion, that of the Huns, was repelled. After ravaging the Eastern empire (441-450), Attila, the 'scourge of God,' was defeated at Châlons by the Visigoths, and died in 453. But in 455 Genseric and his Vandals from Africa again took Rome. The Visigoths took possession of Italy, and their leader Ricimer put up and deposed whatever emperor he chose. There was still an emperor at Rome or Ravenna; but Ricimer called himself king at Milan, and after his death (472), Odoacer, having suppressed some rivals, took the same position. In 476 he deposed Romulus Augustulus (son of Orestes, his predecessor in command of the army), and made himself king of Italy; though Zeno, emperor of the East, still regarded Julius Nepos, who had been recognized in 474, as emperor till his death in 480. The senate signified to Zeno at New Rome that they were content with one emperor, and that 'the republic would be protected by Odoacer.' The Western empire, thus merged in the Eastern, was in a sense revived by Charlemagne in 800 as 'the Holy Roman Empire,' and continued with various developments till the resignation of Francis II. in 1806. Its connection with Rome ceased after Charles V. (1519). The imperial pretensions were meanwhile maintained at Constantinople till 1453. For modern Rome, see ITALY.

Bibliography. 1. *Latin*.—For early Roman history there are no contemporary authorities. Our chief source is Titus Livius, who wrote a *History of Rome* from the foundation to 9 B.C. Cicero's works give a vivid contemporary picture from about 70 to 43 B.C. For the conquest of Gaul (58-51 B.C.) and the civil wars from 49 to 45 B.C. we have the *Commentaries* of Julius Cæsar. Another history is by Aurelius Victor, *The Origin of Rome, Illustrious Men, and The Cæsars* from Augustus to Constantius II.

2. *Greek*.—Polybius, for the first Punic War, and a great part of the second. Dion Cassius wrote a history of Rome from the foundation to the reign of Elagabalus (222); it is particularly valuable for the period of the Civil War and the *principates* of Augustus, Caligula, and Trajan.

3. *English*.—Larger histories are Mommson's *The History of Rome and Provinces of the Roman Empire*; Merivale's *General History to A.D. 476*, and *Fall of the Roman Republic*; Gibbon's *Decline and Fall of the Roman Empire*; Fowler's *Roman Festivals*; Smith's *Dictionary of Roman Antiquities*.

**Rome**, city, Georgia, 50 m. n.w. of Atlanta. Shorter College for Women (Baptist), the Martha Berry Industrial School for boys and girls, and a boys' preparatory school are situated here. The leading industrial establishments are cotton and lumber mills, tanneries, foundries, machine shops, and various manufactories. It is a large peach and cotton market. The region is also rich in mineral wealth, bauxite, iron ore, barytes, and tripoli ore being extensively mined; p. 26,282.

**Rome**, city, New York, Oneida co., on the Mohawk River, 14 m. n.w. of Utica. It is the seat of a State Custodial Asylum and of the Central New York Deaf Mute Institution.

**Rome, Prix de**, a prize founded in 1666 by Louis XIV. of France, to enable young painters and sculptors to study at Rome. It is now granted by the French government, following competitive examination, to painters, sculptors, musicians and architects (annually); line engravers (biennially); engravers on fine stones and medalists (triennially). The winner is allowed four years study at the Villa Medici in Rome, which is under the direction of the Académie des Beaux Arts.

**Rommell, Erwin Eugen Johannes** (1891-1944), German soldier, served in World War I and later became a Nazi; trained the Storm Troops and Elite Guards. In World War II was field marshal; drove the British back into Egypt, but was later defeated; died in action, 1944.

**Romney, George** (1734-1802), English portrait painter, was born in Dalton, Lancashire. He painted fashionable men and women of the day, and was noted as a painter of boys; yet he was never admitted to the Academy. He also painted large historical compositions. His work lacks concentrated vigor and spiritual insight, and is unequal; but his best has simplicity, poetical

treatment, and dexterous draughtsmanship, and gives an impression of movement and of elusive grace.

**Romulo, Carlos Pena** (1900- ), U. S. Army officer and author, was born in Manila; educated at Columbia; professor and public official in Philippines. Rescued from Bataan in 1942, became Gen. MacArthur's aide-de-camp. Wrote *I Saw the Fall of the Philippines* (1942).

**Romulus**, in ancient Roman legend, the son, by Mars, of Rhea Sylvia, and twin-brother of Remus. Mother and children having been cast into the river Anio, the mother was turned into a goddess, and the children were washed ashore and suckled by a she-wolf. After they had founded Rome, Romulus, having slain his brother Remus, made the Capitol an asylum for homicides and fugitive slaves. Romulus reigned to 715, until he was carried up to heaven in a fiery chariot by Mars, his father.

**Rondeau**, or **Rondel**, a form of lyric akin to the sonnet, of French origin, consists usually of thirteen iambic lines, arranged in three irregular strophes, with only two rhymes, and with a refrain repeated in the first, eighth, and thirteenth lines.

**Rondo**, an early form of instrumental composition, in which the first and principal subject alternates with other subsidiary subjects. At first it seldom contained more than two subjects, but Mozart, Beethoven, and later composers introduced three, the second and third, when reappearing, being always in new keys, and frequently developed or varied to a considerable extent.

**Ronge, Johannes** (1813-87), the leader of the German Catholic movement, was born at Bischofswalde in Silesia, and became (1840) a Roman Catholic priest. While acting as teacher of a village school, he drew on himself excommunication. Thereupon he established a 'German Catholic' church independent of the pope. Having taken part in the political movement of 1848, he had to take refuge in London, where he lived till 1861.

**Ronsard, Pierre de** (1524-85), French poet, was born near Vendôme. The object he set before himself was to impart something of the ancient classic polish to the French language, and so render it better fitted to be the vehicle of poetic expression. His lyrics alone are palatable to modern readers. Sainte-Beuve edited (1828; new ed. 1879) his *Œuvres Choies*. Some of Ronsard's poems were translated by Longfellow;

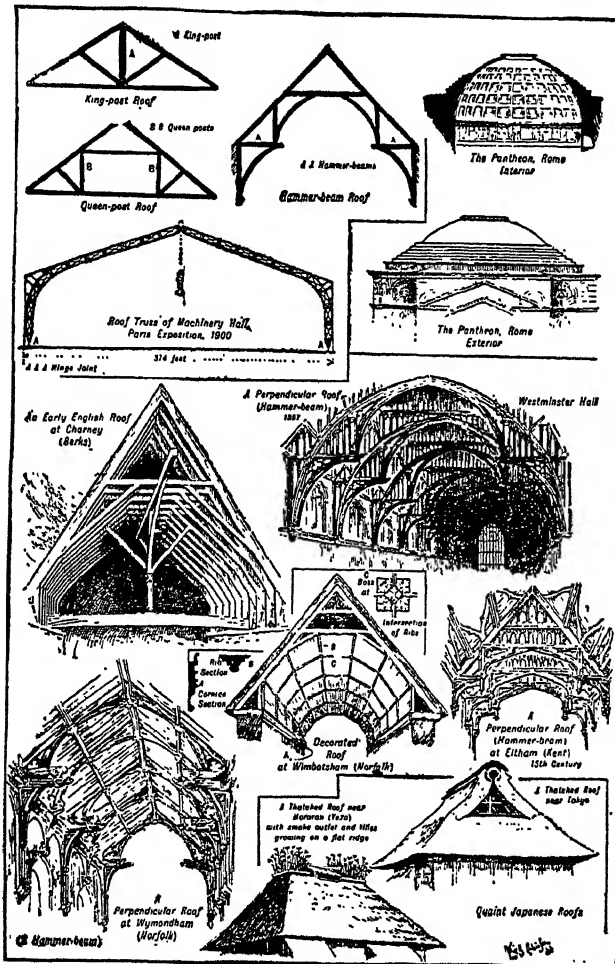
also by Page in his *Songs and Sonnets of Pierre de Ronsard* (1903).

**Röntgen, Wilhelm Konrad von** (1845-1923), German physicist was born at Lennep. It was while he was professor of physics at Würzburg that he made the discovery for which his name is chiefly known, the Röntgen rays, popularly known as X-rays, a

cel screen, hence termed the rood screen. Generally figures of the Virgin and St. John were placed on each side.

**Rood**, a unit of superficial measurement, the fourth part of a statute acre, and equal to 40 square perches or poles, or 1,210 square yards.

**Rood, Ogden Nicholas** (1831-1902), Am-



*Types of Roofs.*

name he used owing to doubt of the exact nature of these curiously acting rays.

**Röntgen Rays, X-rays.** See **Vacuum Tubes, Radio-Activity and Radium.**

**Rood**, a cross or crucifix; specifically a representation of the crucified Saviour, or more commonly, of the Trinity, placed in Roman Catholic churches on or over the chan-

cel screen, hence termed the rood screen. Generally figures of the Virgin and St. John were placed on each side. **Rood**, a unit of superficial measurement, the fourth part of a statute acre, and equal to 40 square perches or poles, or 1,210 square yards. **Rood, Ogden Nicholas** (1831-1902), Am-

application of stereoscopic photography to the microscope, besides devising a flicker photometer of novel form.

**Roosevelt, Franklin Delano** (1882-1945), thirty-second President of the United States, was born in Hyde Park, New York, January 30, 1882, and educated at Groton and Harvard, where he was graduated in 1904. In 1905 he married his cousin, Anna Eleanor Roosevelt. Five children were born to them, James, Anna, Elliott, Franklin D., and John A. After three years at Columbia University Law School he was admitted to the bar and practised with Carter, Ledyard and Milburn, 1907-1910. In 1911 he became a member of the law firm, Marvin, Hooker and Roosevelt, and in 1924 of Roosevelt & O'Connor. He was elected to the New York State Senate in 1910 and resigned to become Assistant Secretary of the Navy, 1913-1920, which period covered the World War. As State Senator, he led important opposition to Tammany Hall, blocking Boss Charles E. Murphy's efforts to dictate the senatorial nomination of William Sheehan. He was nominated for Vice-President at the Democratic National Convention, 1920. In 1928 he was elected Governor of New York for the term 1929-1931, and reelected for a second term during which he removed a New York County Sheriff and forced the resignation of James J. Walker Mayor of New York City.

At the Democratic National Convention in 1932 Mr. Roosevelt was nominated for the Presidency on the fourth ballot, July 1. The ensuing November election proved a sensational victory for the Democrats. The day of Roosevelt's inauguration, March 4, marked so serious a crisis in the banks of the country that Roosevelt proclaimed a bank holiday beginning March 6, during which no money could be paid out; he also called a special session of Congress for March 9. He was able to get numerous measures passed by this Congress and soon began the planning of the New Deal. (See UNITED STATES, NEW DEAL). In 1936 he won a second term over Alfred M. Landon, carrying every state except Vermont and Maine. In 1937 he called for a reorganization of the Supreme Court. (See SUPREME COURT). In 1938 the wages-and-hours law was passed, establishing a 40-hour week and fixing minimum wages. This term was also marked by the many sit-down strikes.

In 1940 he broke the tradition against a third term and defeated Wendell L. Willkie.

In his message to Congress, Jan. 6, 1941, he advocated four freedoms: freedom of speech and religion, freedom from want and fear. He joined Prime Minister Churchill in issuing the Atlantic Charter (see ATLANTIC CHARTER), secured the passage of the Lend-Lease Bill (see Lend-Lease), and following the Japanese attack on Pearl Harbor, Dec. 1941, called on Congress to declare war against Japan and Germany. In 1942 he established the War Labor Board and asked for fixed price ceilings and rationing of essential commodities. In 1943 and 1944 he was engrossed in war problems, with conferences at Casablanca, Cairo and Teheran. In some instances labor troubles led to government seizure and operation of war plants.

In 1944 Roosevelt won a fourth-term victory over Thomas E. Dewey. He attended the Crimea Conference at Yalta (see CRIMEA CONFERENCE) in Feb. 1945. Here, as in previous Allied conferences, he evidenced marked ability as a statesman. On April 12, while on a visit at Warm Springs, Ga., he suffered a cerebral hemorrhage and died suddenly. On April 14 funeral services were held in the White House in Washington and on the following day the President was buried in the garden of his estate at Hyde Park, N. Y.

Pres. Roosevelt will be remembered for the many democratic social measures he sponsored and for his able leadership in World War II. Consult Lindley's *Franklin D. Roosevelt*, (1932); Looker, *This Man Roosevelt* (1932); Mrs. Sara Roosevelt, *My Boy Franklin* (1933); Ross & Grobin, *This Democratic Roosevelt* (1932).

**Roosevelt, Kermit** (1889-1943), son of Theodore Roosevelt, president of the Roosevelt Steamship Company. His books include *War in the Garden of Eden* (1919); and *American Backlogs* (1928).

**Roosevelt, Nicholas** (1893- ), diplomatist and editorial writer, was appointed Minister to Hungary by President Hoover in 1930. He resigned later to join the staff of the New York Herald Tribune. Earlier, he had been Vice-Governor of the Philippines. He wrote several books, including *The Restless Pacific*, *The Philippines, a Treasure and a Problem*, and *America and England*.

**Roosevelt, Nicholas J.** (1767-1854), American inventor, was born in New York. During the Revolution he invented a paddle boat in which the movement of the paddle was produced by springs. In 1802 he assisted

Robert Fulton in building a small marine engine, and in 1809 he formed a partnership with Fulton for constructing steamboats for the Western rivers.

**Roosevelt, Robert Barnwell** (1829-1906), American author, uncle of President Theodore Roosevelt, born in New York. He established the New York State Fishery Commission, and was president of the International Association for the Protection of Game; also a member of the American Association for the Advancement of Science. Among his published works are: *The Game Fish of North America* (1860); *The Game Birds of the North* (1866); *Florida and the Game Water Birds* (1869).

**Roosevelt, Theodore** (1858-1919), twenty-sixth President of the United States, was born in New York City, Oct. 27, 1858. He was the son of Theodore (1831-78), and Martha (Bulloch) Roosevelt, and was descended in a direct line from Claes Martenszoon and Jannetje (Thomas) Van Roosevelt, who came to New Amsterdam from Holland about 1651. He was graduated from Harvard in 1880, and married in the same year Alice, daughter of George Cabot and Caroline (Haskell) Lee of Boston, Mass. She died in 1883, leaving one daughter, Alice Lee—later Mrs. Nicholas Longworth.

After a short course in law Roosevelt began to take an active interest in politics, becoming a Republican member of the New York State Assembly in 1882, 1883, and 1884. He was a delegate to the Republican State convention of 1884, and delegate-at-large from New York and chairman of the New York delegation to the Republican National Convention at Chicago in June, 1884. He also became a member of the New York militia, serving in the 8th regiment of the State National Guard. He married for his second wife, on December 2, 1886, Edith Kermit, daughter of Charles and Gertrude Elizabeth (Tyler) Carow of New York City. President Harrison appointed him, in May, 1889, a member of the United States Civil Service Commission, and President Cleveland continued him in office until, in the spring of 1895, he resigned to enter the administration of Mayor Strong in New York as police commissioner. He was recalled to Washington two years later to take the position of Assistant Secretary of the Navy.

War with Spain having been declared in April, 1898, Roosevelt recruited the First U. S. V. Cavalry, better known as the Rough Riders. In November, 1898, he became the

Republican candidate for governor of New York. His two years' administration was conspicuous for its vigorous reform of the State canal management and the establishment of an improved civil service system. In June, 1900, he was forced, much against his own preference, to accept a nomination for Vice-President on the ticket with William McKinley for President. He was sworn into office in March, 1901. In the fall of the same year occurred the assassination of President McKinley, and on September 14 Mr. Roosevelt succeeded to the Presidency. Events of this period were the settlement in 1902 of the coal strike in the anthracite fields of Pennsylvania, and of the Venezuela difficulties of 1902-1903. In 1904 Roosevelt was elected President in his own right. A notable achievement of that administration was the bringing to a close of the Russo-Japanese War, a service for which he was awarded the Nobel Peace Prize in 1906. The secession of Panama from the Colombian confederation in 1903 opened the way for the assumption by the United States of the construction work which had been carried on till that time under French auspices. The recognition of the seceding state as an independent republic, and the negotiation of a treaty vesting the necessary rights in the United States Government, have been styled 'the Roosevelt *coup d'état*.' The enactment of a law conferring practically dictatorial powers in the Canal Zone upon the President placed the matter on a settled footing, and thereafter he supervised every stage of the proceedings, even visiting the Isthmus in person in 1906. (See PANAMA CANAL.) Roosevelt also prosecuted a vigorous warfare against the aggressions of industrial monopolies, and turned the enginery of the Department of Justice upon several of the so-called trusts.

On March 4, 1909, Roosevelt retired from office. Before the expiration of his term he had planned an expedition to Africa to hunt, and incidentally to gather specimens of rare fauna for the Smithsonian Institution, which outfitted the expedition. His party which included his son Kermit and a small group of naturalists, had many interesting adventures; and sent home trophies embracing 4,897 specimens of mammals, more than 4,000 birds, about 2,000 reptiles and batrachians, and some 500 fishes. The return journey included short stays in leading cities of Egypt, Italy, Austria, France, Belgium, Holland, Norway, Germany, and England, where Roosevelt was highly honored.

Following a rift between himself and President Taft, and a disagreement between himself and Republican leaders, he became in 1912 candidate of his newly organized Progressive Party for the presidency, but was defeated in the November election by Woodrow Wilson. (See UNITED STATES, *History*.) An exploring trip to South America followed



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Theodore Roosevelt.

In 1914. During the World War, Roosevelt urged on the administration an earlier entrance on the side of the Allies than was in the plan of President Wilson. His death occurred suddenly on January 6, 1919.

The personality of Theodore Roosevelt was scarcely less striking than his career. His most notable mental characteristics were an

extraordinary quickness of apprehension, a keen interest in every subject which had to do with human progress, and a whole-souled scorn of the insincere. As an executive he was distinguished for his resourcefulness in devising, and his boldness in attempting, new methods of accomplishing results for which others had struggled in vain over well-beaten paths, and his tireless pursuit of an end upon which he had once fixed his purpose. He was honored with the degree of LL.D. from nearly every important university in the United States, and many European universities. Roosevelt's published works include: *The Winning of the West*; *American Big Game Hunting* (1893); *The Strenuous Life* (1900); *African Game Trails* (1910); *The New Nationalism* (1910); *Theodore Roosevelt, an Autobiography* (1913); *Through the Brazilian Wilderness* (1914); *Life Histories of American Game Animals* (1914); *America and the World War* (1915). His *Complete Works*, in 15 volumes, were issued in 1910.

**Roosevelt Dam**, the chief feature of the Salt River Project, an important irrigation undertaking of the U. S. Reclamation Service, located in the valley of the Salt River, Arizona. The Roosevelt Dam lies in an inaccessible mountain region, 75 m. n.e. of Phoenix. The site of the dam is in a narrow gorge cut by the river through a lofty ridge of sandstone, which helped supply the material for its construction. The dam was completed in 1911 at a cost of \$6,500,000. Its base covers about an acre of ground, and it rises, from foundation to parapet, 286 ft. At the base it is 235 ft., and on the top 1,080 ft., in length. The dam is built on a curve upstream, having a radius of about 400 ft. The reservoir outlet is through a tunnel about 500 ft. long, in which are six gates to be used for sluicing and for regulating the flow from the reservoir. With the reservoir full these gates discharge about 10,000 cubic ft. per second. Two spillways, each about 200 ft. long, carry the flood waters around the dam. The dam backs up the waters of Salt River and Tonto Creek about 16 m., making a lake about 25 m. long, and 1 to 2 m. wide, impounding about 1,200,000 acre ft. (about 456,190,000,000 gallons) of water. On Feb. 5, 1911, the last stone was set, and on March 18 the dam was formally opened by Theodore Roosevelt, in whose honor it is named.

**Root**, in Algebra, denotes any value of the unknown quantity in an equation which will



A CLIMBING ROSE

render both sides of it identical (see EQUATION). In arithmetic, the *square root* is that number which, multiplied by itself, produces the given number; the *cube root*, the number which, multiplied into itself and then into the product, produces the given cube; so with *fourth root*, *fifth root*, etc.

**Root**, in Plants, is that part which absorbs nourishment from the soil or from water. The root ordinarily grows downward, and its functions are the fixing of the plant in the soil, and the extraction therefrom of solutions of mineral salts and other food material, which are passed on through the stem to the leaves. As the leaf surface of a seed plant is developed the root system grows; in a large sunflower it occupies about one cubic yard, in a large tree hundreds of cubic yards. The primary root is merely the enlarged radicle of the seedling: it is the direct prolongation of the stem. All secondary roots arise from this first root; the secondary roots may give rise to others, and so on, until the common much-branched root is formed. When the primary root is much thicker than the secondary roots it is called a tap root. Roots are also described as fleshy (the beet roots), or as woody (the roots of trees).

Roots are usually buried in the soil, but they may be aerial, as in the ivy; these arise from the stem, and fix the plants to their supports. In the tropics many plants have aerial roots; thus the mangrove forms forests in the swamps. Aquatic plants often have roots which do not penetrate into the mud, but float freely in the water.

Root stock or Rhizome is the name given to an underground stem that is easily distinguished from a root by the fact that it ends in a bud, and bears leaves or scales. In the autumn the aerial leaves die down, but the rhizome lives through the winter, and in the spring its terminal bud goes on growing. See PLANTS.

**Root, Elihu** (1845-1937), American lawyer and public official, was born in Clinton, N. Y. He practised law in New York, and made rapid strides in his profession. He was counsel for William M. Tweed in the celebrated Tweed Ring trial; and for many great corporations and railway companies. From 1881 to 1885 he was district attorney for the southern district of New York.

In 1899 Elihu Root succeeded Russell A. Alger as Secretary of War, and at once set about reforming the Department. In 1904 he retired to the practice of law in New York City; but in July, 1905, upon the death of

John Hay, re-entered the Cabinet as Secretary of State. In this office he did much toward reorganizing the consular service and improving the business methods of the Department. In 1909 he was elected U. S. Senator, to succeed Thomas C. Platt, for the term ending in 1915. In 1912 he was permanent chairman of the Republican National



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Elihu Root.

Convention, and in 1916 candidate for the Republican presidential nomination. The Nobel Peace Prize of 1912 was awarded to Root in recognition of his services for the pacification of Cuba and the Philippines, and his handling of various matters in dispute between Japan and the United States. He was trustee of the Cooper Union and Metropolitan Museum of Art, director in several companies, and held important offices in both national and international bodies.

**Root, George Frederick** (1820-95), American composer and organist, composed some of the most popular songs of his time, notably 'The Battle Cry of Freedom,' 'Tramp, Tramp, Tramp,' 'Just Before the Battle, Mother,' and the quartet, 'There's Music in the Air.'

**Roots, Logan Herbert** (1870), American



bishop, was born near Tamaroa, Perry co., Ill. He studied at the Episcopal Theological Seminary, Cambridge, Mass. In 1896 he went to China, where he was engaged in general missionary work until 1904. In that year he was consecrated missionary bishop of Hankow, China.

**Roper, Daniel Calhoun** (1867-1943), Secretary of Commerce, was born in Marlboro co., S. C. He was a member of the S. C. House of Representatives, 1892-4; clerk of the U. S. Senate Committee on Interstate Commerce, 1894-7; clerk of the Ways and Means Committee of the House of Representatives, 1910-13; first-asst. Postmaster-General, 1913-16; vice-chairman U. S. Tariff Commission, 1917; commissioner of Internal Revenue, 1917-20; Secretary of Commerce 1933-39.

**Ropes.** The term rope is usually confined to the larger species of cordage, such as exceed one inch in circumference, though the principles of manufacture are the same for all kinds of cordage. The materials used include Manila hemp, flax, cotton, hemp, jute, sisal, coir, and other vegetable fibres. These are spun into yarn by machines resembling in principle those used for spinning cotton. A dozen of these yarns may be 'laid' together by machine, to form a small strand called twine, and three or more strands be similarly laid together to form a small cord. For rope making the same operations are performed, but with a larger number of yarns to the strand. The first machines for rope making were used in England in 1820; while thoroughly practical machinery was first employed in Massachusetts in 1834. Since that time many improvements have been made, and American rope-making machinery is used all over the world.

**Rops, Félicien** (1833-98). Belgian painter and etcher, was born in Namur. He gained a high reputation as an engraver and painter in oil and water colors. Examples of his art are the engravings *Buveuse d'Absinthe* (1865) and *Dame au Pantin* (1871), and the water colors *La Scandale* (1876), *Une Attrapade* (1877), *Tentation de St. Antoine* (1878), and *Pornocrates* (1878). He was also an illustrator of note.

**Roque**, a development of the game of croquet, but requiring a greater degree of skill and accuracy. It can be played by two, but four or eight players, playing partners, make a more interesting contest. The National Roque Association, which controls the game in America, was founded in 1882, and

since that time has held annual championship tournaments, the title being awarded in three divisions, the players being formed into classes according to merit. There are also sectional tournaments with championships. For rules of the game, consult Spalding's *Official Roque Guide*.

**Roque, Saint** (1293-1327), patron saint of sufferers from plague, was born in Montpellier and travelled as a pilgrim through France, Italy, Spain, and Germany, ministering to the sick.

**Roquefort**, town, Southern France, in the department of Aveyron. It has been famous since Roman times for its cheeses, made of goat's milk and sheep's milk and matured in grottoes and cellars beneath the village; p. 1,200.

**Roraima**, highest mountain in British Guiana, the culminating point of the Pacaraima range, situated at a point where Venezuela, British Guiana, and Brazil meet. The upper part rises in precipices from 1,600 to 3,000 ft. high; the upper surface is an immense red sandstone rock, nearly 8 m. long, and extremely picturesque. The highest point is 8,740 ft. above sea-level.

**Rosa, Carl August Nicholas** (1843-89), German operatic impresario and musician, was born in Hamburg, his real name being Rose. He studied in Leipzig and in Paris, made a tour of the United States in 1867, when he married Euphrosyne Parepa, the famous soprano, and sang with her in the principal American cities in 1869-72.

**Rosa, Monte**, the name given to a group of lofty Alpine peaks between Switzerland and Italy, near Zermatt.

**Rosa, Salvator** (1615-73), Italian painter, etcher, and poet, was born near Naples. He went in 1635 to Rome, where he found favor with Cardinal Brancaccia. He returned to Naples, but in 1639 again went to Rome, where he soon became famous as a painter, poet, and musician, and where, except for nine years in Florence (1642-51), he spent the remainder of his life. Rosa was especially successful in battle scenes, marine views, and landscapes, particularly wild and gloomy scenes, storms, and tempests. Among his best known pictures are the *Conspiracy of Catiline*, *La Fortuna*, *Prometheus*, *Jacob's Dream*, *Jonas Preaching at Nineveh*, *Saul and the Witch of Endor*.

**Rosaceæ**, a large natural order of plants, including the apple, pear, plum, strawberry, raspberry, almond, and rose. The flowers usually consist of a five-lobed calyx, five

regular petals inserted on the calyx, numerous stamens, and a variable pistil. Among the genera are *Rosa*, *Pyrus*, *Mespilus*, *Rubus*, *Geum*, *Dryas*, *Potentilla*, *Fragaria*, *Spiræa*, and *Prunus*.

**Rosario**, town, Argentina, in the province of Santa Fe, the second largest city of the country, on the Parana River. It is a flourishing modern town, the terminus of six railways, a port, and an emporium of commerce. Large sugar refineries are situated here; p. 265,000.

**Rosary**, or **Prayer Beads**, a string of beads of various sizes by means of which count is kept of prayers. In the rosary used in the Roman Catholic Church the smaller beads represent Ave Marias, the larger Paternosters. The ordinary rosary consists of fifty-five beads, each ten Ave Marias being separated by a Paternoster. The rosary of the Blessed Virgin consists of fifteen decades of prayers, containing fifteen paternosters and doxologies, and 150 Ave Marias. The lesser rosary is composed of a third of these exercises. Rosary Sunday, instituted by Gregory XIII., is the first Sunday in October.

**Rosas, Juan Manuel** (1793-1887), Argentine dictator, was born in Buenos Ayres. In 1829 he became governor, and in 1835 dictator, of Buenos Ayres. His energetic rule soon restored tranquillity to a province distracted by twenty years of civil strife, and his 'League of Governors' was the germ of the Argentine Republic.

**Roscher, Wilhelm** (1817-94), German political economist, was born in Hanover. In 1848 he was called to the chair of political economy at Leipzig, and there he remained, exercising a wide influence, until his death. Not the least valuable of his writings are his critiques of early writers on economics.

**Roscius, Quintus** (?-62 B.C.), the most famous comedian of ancient Rome, was born in Solonium, near Lanuvium. He was patronized by the dictator Sulla, and was an intimate friend of Cicero.

**Roscoe, Sir Henry Enfield** (1833-1915), English chemist, born in London, was a grandson of William Roscoe, the historian. He was professor of chemistry at Owens College, Manchester, 1857-1887, and vice chancellor of the University of London, 1896-1902. His chief chemical researches were on vanadium and the chemical action of light.

**Roscoe, William** (1753-1831), English historian, was born in Liverpool. His numerous writings include a protest against the slave trade (*Wrongs of Africa*, 1787-88), of

which he was a staunch opponent, but it is as the historian of Lorenzo de' Medici (1795), and of Pope Leo X. (1805), that he is best remembered.

**Roscommon**, inland county, Ireland, in the province of Connaught; with an area of 915 sq. m. The surface is level or undulating with hills in the n. Agriculture is the principal industry; p. 93,904.

**Rose** (*Rosa*), a genus of ornamental shrubs grown chiefly for their beautiful flowers and handsome foliage. They are found in all countries of the world and are native to all except parts of South America and the tropics. Rose cultivation is among the oldest branches of horticulture and the rose is a prime favorite among all lovers of flowers.

Roses are mostly low, medium sized shrubs, usually with prickly stems, odd-pinnate leaves, and large solitary or clustered flowers ranging in color from a deep rich crimson to white and yellow. There are single and double varieties, wild and cultivated, climbing, bushy, dwarf, and tall; some exceedingly fragrant, some practically odorless.

For practical purposes, roses may be divided into two great classes: summer roses, blooming in May, June, and July; and autumn roses, blooming from May until the frost comes. Among the summer roses are the Provence Rose (*R. centifolia*); the Moss Rose; the Damask Rose (*R. damascena*); the Sweet Briars (*R. rubiginosa*); the Polyantha roses (*R. multiflora*), among which are the well known Crimson Ramblers; and the Wichuraiana roses (*R. wichuraiana*), which include the Dorothy Perkins, Minnehaha, Gardenia, Lady Godiva, and other popular varieties. The autumn roses, which comprise species that flower several times from May to October, include Hybrid Perpetual Roses; Tea Roses; Noisette Roses; Japanese Roses (*R. rugosa*); and many others. Roses are propagated from seeds, buds, cuttings, and grafts. New varieties are grown from seeds planted in carefully prepared and well-manured beds. The ideal soil is a rich deep loam, but clay or sand may be used if properly manured. The rose bed should be carefully drained, as roses are injured by excessive moisture. Planting may be done either in autumn or spring, autumn being preferred when the winters are not too severe. During planting, the roots should be kept away from the wind and not allowed to become dry; they should have plenty of room, and should point downward, rather than spread out flat. The spaces around the

roots should be filled in with well pulverized soil, and this should be tramped in securely around the bush. Roses require more or less pruning for the removal of dead wood, to make the bush symmetrical, and to encourage the development of buds. Most rose growers consider early spring the best time for pruning. The chief insect pests to be combated are the rose aphids or lice, which feed on the juice of the plant, the rose-slug, the leaf-hopper, the rose chafer, the rose midge, rose curculio, and thrips. Spraying with arsenic or a nicotine solution or destroying all in-

ister of public works, and in 1864 was named by the British Government as commissioner in the negotiations with the United States in the settlement of the Oregon claims. In 1868 he floated the loan in England for the completion of the Intercolonial Railway. He retired from public life in Canada in 1869 and settled in England, but the same year was appointed special commissioner to Washington to arrange a new fisheries treaty and to settle the Alabama Claims. He drew up the Treaty of Washington in 1870.

**Rose, Roman de la**, a French poetico-



*Photo from A. T. De la Mare Co.*

#### *Roses.*

Left, Scotch Briar; Right, Melody.

fest buds may be employed as remedial measures.

**Rose, Chauncey** (1794-1877), American merchant and philanthropist, was active, also, in promoting railroad development in Indiana and other States. By a defective will, he became sole heir to the fortune of his brother, John, whose known wishes he carried out by distributing more than a million dollars to charities in New York City and elsewhere. He founded Rose Polytechnic Institute, at Terre Haute.

**Rose, Sir John** (1820-88), Canadian statesman. From 1858 to 1861 he was min-

ister of public works, and in 1864 was named by the British Government as commissioner in the negotiations with the United States in the settlement of the Oregon claims. In 1868 he floated the loan in England for the completion of the Intercolonial Railway. He retired from public life in Canada in 1869 and settled in England, but the same year was appointed special commissioner to Washington to arrange a new fisheries treaty and to settle the Alabama Claims. He drew up the Treaty of Washington in 1870.

**Rosebery, Archibald Philip Primrose, Fifth Earl of**, and **First Earl of Midlothian** (1847-1929), British statesman, was born in London. From 1881 to 1883 he was Undersecretary of State for Home Affairs, and in 1886 was Foreign Secretary, becom-

ing premier on Gladstone's retirement in 1894.

**Rose Chafer** (*Macrodactylus subspinosus*), a small beetle, light brown in color, with long spiny legs, which feeds on roses and other ornamental shrubs, and also attacks the blossoms of apples, plums, cherries, grapes, and various grains and vegetables.

**Rose Cold.** See **Hay Fever**.

**Rosecrans, William Starke** (1819-98), American soldier. On the outbreak of the Civil War he became a volunteer aide on the staff of General McClellan. He succeeded McClellan as commander of the Department of the Ohio; was put in command of the Army of the Mississippi; succeeded General Buell in command of the Army of the Cumberland. His defeat at Chickamauga in 1863 was the only blot on his military record.

Rosecrans went as minister to Mexico in 1868; was a member of Congress from California during 1881-5; and was register of the national treasury from 1885 to 1893.

**Rose Geranium.** See **Pelargonium**.

**Roselle**, borough, New Jersey, Union co.; 3 m. w. of Elizabeth. It has manufactures of hydraulic machinery; p. 13,597.

**Roselle Park**, borough, New Jersey, in Union co.; chiefly a residential town; p. 9,661.

**Rosemary** (*Rosmarinus officinalis*), an aromatic, evergreen herb which has long been cultivated in gardens as an ornamental shrub. It has tiny light blue flowers and narrow leaves which are used for seasoning. An essential oil obtained from the leaves is used as a perfume.

**Rosen, Charles** (1878- ), American landscape painter, was born in Westmoreland co., Pennsylvania. He studied in the National Academy of Design and the New York School of Art, and received numerous awards for his work, including the Inness gold medal and first Altman prize of the National Academy of Design in 1916.

**Rosen, Roman Romanovitch, Baron** (1847-1921), Russian diplomatist, born of Swedish stock. He was successively chargé d'affaires in Japan, consul-general at New York, and chargé d'affaires at Washington. He was minister to Japan from 1903 until the outbreak of the Russo-Japanese War, Ambassador to the United States from 1905 to 1911, and a joint plenipotentiary with Count Witte in the Russo-Japanese peace negotiations at Portsmouth, N. H., in 1905. After the Bolshevik revolution, having lost all his possessions, he escaped to the United

States. He published *Forty Years of a Diplomat's Life*.

**Rosenbach, Abraham Simon Wolf** (1876- ), American bibliophile. For his own account and as the representative of others he has spent millions for rare books in the auction rooms of Europe and America. He acquired a Gutenberg Bible for \$106,000, one of the highest prices ever paid for a single volume. He maintains offices in Philadelphia, where he lives, in New York, and abroad.

**Rosenthal, Moriz** (1862-1943), Austrian pianist, was a pupil of Liszt. He made numerous successful concert tours of Europe and the United States.

**Rose of Lima, Saint** (1586-1617), a nun of the third order of Dominicans, was born in Lima, Peru, the daughter of Gaspard Flores of that city. She entered the order in 1606, and gained a reputation for the severe regimen of her life, of which many stories are extant. She was canonized by Clement X, who fixed her day as Aug. 30. She was the first American saint so canonized.

**Rose of Sharon**, a name sometimes given to the Syrian mallow (*Hibiscus syriacus*), a beautiful shrub with brilliant flowers, ranging in color from purple and red to a delicate pink and white.

**Rose Quartz.** See **Quartz**.

**Roses, Wars of the**, the name given the series of struggles in England in the latter half of the 15th century between the houses of York and Lancaster. They were so named from the badges worn by the rival factions, that of York being a white rose and that of Lancaster a red one. During the temporary insanity of Henry VI. of the house of Lancaster, in 1453-4, the Duke of York became protector of the realm. When, on the king's recovery, he was dismissed from office, the Yorkists, armed, won the battle of St. Albans on May 22, 1455, and York again became protector. In 1456 York was dismissed a second time, and in Sept. 1459, Salisbury defeated the Lancastrians at Bloreheath. Henry VI. then met the Yorkists at Ludlow, Richard of York escaping to Ireland, and Salisbury and Warwick to Calais. A Parliament was then called by the royalists at Coventry, and the Yorkist leaders were attainted. So far the struggle had been for control of the government. After the attainder of York, Salisbury, and Warwick, at Coventry, the war became one for life and death. At the battle of Northampton, in July 1460, Warwick captured Henry VI., and a Parliament

decided that Henry should rule during his lifetime, but should be succeeded by York. In the north, however, the Lancastrians would not yield, and on Dec. 31, 1460, they defeated and slew Richard of York and Salisbury at Wakefield. Queen Margaret, wife of Henry, at the head of the victorious army, marched south, defeating Warwick on Feb. 17, 1461, at the second battle of St. Albans, and setting Henry vi. at liberty. Meanwhile Edward of March, the eldest son of Richard of York defeated Jasper Tudor at Mortimer's Cross, and arrived in London on Feb. 26. Margaret retreated and Edward was proclaimed king as Edward iv. He at once marched north, and inflicted a decisive defeat on the Lancastrians at Towton on March 29, 1461, and thus definitely secured the throne. The Wars of the Roses now entered upon their third and final phase. After being defeated by Warwick, Margaret fled to France, while Henry vi. was captured in 1465 and imprisoned in the Tower. During 1469, 1470, and 1471, many sudden political changes took place, the Yorkists winning Edgecote Field in 1469, and being defeated at Losecoat Field in 1470. Warwick's flight to France was soon followed by his return, and by Edward's flight to Flanders. On his return in 1471 Edward overthrew and killed Warwick at Barnet, and defeated Queen Margaret at Tewkesbury. The accession of Henry vii. after the battle of Bosworth, and his marriage with Elizabeth of York, finally gave England peace.

**Rosetta Stone**, the name given to an inscribed slab of basalt (38 by 30 in.) found near Rosetta, in the Nile delta, in 1799, and now preserved in the British Museum. It gave the key to the interpretation of Egyptian hieroglyphics, the legend inscribed upon it being trilingual. The inscription is a decree of Ptolemy Epiphanes, promulgated at Memphis in 196 B.C.

**Rose Window**, in architecture, a window chiefly seen in Gothic buildings, circular in form, the interior space being filled in with tracery work, the main parts of which in some instances radiate like the spokes of a wheel.

**Rosewood**, the wood of various tropical trees, the best being that of the Brazilian *Dalbergia nigra* and other members of the same genus. It is a hardwood, of a reddish brown or purple color, with a pleasant odor resembling that of a rose, hence the name. It is highly valued for cabinet work and for furniture.

**Rosicrucians**, a mystical society claiming to be the guardian of secret knowledge of the nature and purpose of the universe and of the real nature of man, allegedly derived from the Mysteries of Egypt, Greece and Rome. Modern Rosicrucians trace their name to a Benedictine monk, Christian Rosenkreuz (1378-1484), who travelled in Palestine and Arabia during 1393-1402 receiving mystical initiations. Returning to Germany, Rosenkreuz organized a group of seven, one of whom established the cult in England. The United States has three legitimate Rosicrucian bodies which maintain colleges in the large cities and issue courses in esotericism and the mystical interpretation of the Bible.

**Ross, Betsy** (1752-1836), maker of the first American flag, according to the tradition that she sewed it for a committee on which were George Washington and Robert Morris.

**Ross, Edward Alsworth** (1866- ), American economist, born in Virden, Ill. He was professor of economics at Indiana University, at Cornell, and at Leland Stanford (1893-1900). In 1901 he was lecturer at the University of Nebraska and at Harvard. His publications include: *Honest Dollars* (1896); *Social Control* (1901); *The Changing Chinese* (1911); *Russia in Upheaval* (1918); *The Social Revolution in Mexico* (1918); *The Russian Soviet Republic* (1923); *Roads to Social Peace* (1924); *World Drift* (1928).

**Ross, George** (1730-79), American politician, signer of the Declaration of Independence, born at New Castle, Del. He was a delegate to the Continental Congress.

**Ross, Sir James Clark** (1800-62), British admiral famous as an Arctic and Antarctic explorer, made five successive voyages to the Arctic regions with his uncle, Sir John Ross, and with Sir W. E. Parry. From 1829 to 1833 he was engaged in further voyages, and in 1831 determined the position of the north magnetic pole. From 1839 to 1843 he commanded the expedition of the *Erebus* and *Terror* into the Antarctic seas, and reached latitude 78° 10' s.

**Ross, Sir John** (1777-1856), British admiral and Arctic explorer, began his career in 1818, when he accompanied Parry to explore Baffin Bay. From 1829 to 1833 he was on another Arctic expedition.

**Ross, John** (1790-1866), Cherokee Indian chief, son of Daniel Ross, acted as the chief agent of the Cherokee nation in their struggle to prevent their removal from Georgia.

**Ross, Nellie Tayloe** (1880- ), Ameri-

can public official, was born in St. Joseph, Mo. She married William Bradford Ross, lawyer, who became governor of Wyoming in 1923 and died in Oct., 1924. She succeeded him Jan. 5, 1925, to fill out his unexpired term ending in 1927. She was vice chairman of the Democratic National Committee, in charge of the activities of Democratic women. In April, 1933, she was appointed Director of the United States Mint, the first woman to hold that office.

**Ross and Cromarty**, Highland co., Scotland, stretching from Moray Firth in e. to beyond Outer Hebrides in w.; area 3,089 sq. m. Much of the county is wild and mountainous. Sheep-farming is largely carried on, also salmon and sea fishing; p. 62,082.

**Rossellino, Antonio** (c. 1427-c. 1479), whose real name was Gamberelli, Florentine sculptor, studied with Donatello.

**Rossellino, Bernardo** (1409-c. 1464), eldest brother of the preceding, also an Italian sculptor, though he became celebrated as an architect and military engineer, largely in the employment of Pope Nicholas v., and afterward that of Pius II., for whom he restored many of the basilicas of Rome.

**Rossetti, Christina Georgina** (1830-94), English poet, was born in London, the daughter of Gabriele Rossetti, the Italian poet patriot. An exquisite grace, a continual charm, a subtle and delicate music are the characteristics of her poetry. Except for a short residence at Frome in 1853, and some months of travel in France and Italy in 1861, she was rarely away from her London home. Her early *Goblin Market* is her most enduring achievement. Other works are: *Sing-Song* (1872); *A Pageant and Other Poems* (1881); *The Face of the Deep* (1892).

**Rossetti, Dante Gabriel** (1828-82), English poet and painter, whose real name was Gabriel Charles Dante Rossetti, was born in London, the son of Gabriele Rossetti. The poem, *The Blessed Damsel*, was written before Rossetti was twenty. In painting he made himself the pupil of Ford Madox Brown, whose influence directed pre-Raphaelitism and essentially affected Rossetti's art. See **PRE-RAPHAELITISM**. As Beatrice in *Beatrice Denying her Salutation to Dante*, one of the earliest water colors, Miss Siddal (whom Rossetti married in 1860) assumes her place in his art. It is almost entirely in water colors that Rossetti's genius is to be studied during those years. An attempt to decorate the hall of the Oxford Union with tempera paint-

ings from the *Morte d'Arthur* led to his intimacy with Morris, Burne-Jones and Swinburne. In 1861 Rossetti published the volume of translations, *The Early Italian Poets*. His *Poems* were published in 1870. At Kelm-scott Manor, which he shared with the Morris family until 1874, and later at 16 Cheyne Walk, Rossetti painted, and added to his verse the *Ballads and Sonnets* (1881), and completed the large oil replica of *Dante's Dream*.

**Rossini, Gioacchino Antonio** (1792-1868), Italian operatic composer, born at Pesaro. With the production of *Tancredi* (1813) Rossini's name became famous throughout Italy. During the next ten years he composed over twenty operas, among them one of his greatest works, *Il Barbiere di Siviglia* (1816). After a five months' visit to England he settled in Paris (1824), where he was appointed director of the Théâtre Italien. His last and in some respects most famous opera, *Guillaume Tell*, was produced in Paris in 1829. His *Stabat Mater* was his only work of importance after *Guillaume Tell*. Rossini was the greatest Italian operatic composer of his generation.

**Ross Sea**, Antarctic sea, named for Sir James Clark Ross, British explorer, one of the centers of the Antarctic whaling industry. Both the Scott and the Amundsen expeditions to the South Pole were within the Ross Quadrant with territory claimed as a British dependency. On the Ross Sea is the Bay of Whales, the base of the Byrd Antarctic expeditions of 1928 and 1933-1935.

**Rostand, Edmond** (1864-1918), French dramatist, born at Marseilles. In 1894 his verse comedy *Les Romanesques* was produced with the greatest success at the Théâtre Français. Its successors are *La Princesse Loir-taine* (1895), *La Samaritaine* (1897) and *Cyrano de Bergerac* (1897). *L'Aiglon*, which was produced in 1900, is in no way equal to *Cyrano*. Both *Cyrano de Bergerac* and *L'Aiglon* were successfully presented in the U. S.

**Roster**, a list of officers or men for duty, with a record of the duty performed by each. In the U. S. army, all details for service, in garrison or in the field, are made by roster.

**Rostov**, tn., former Yaroslav gov., Central Russia, 34 m. s.s.w. of Yaroslav city. The Church of the Assumption was founded in 1230, and has a famous belfry of c. 1590; the Spasso-Yakovlevskii monastery has a renowned treasury. There are a citadel and

two old palaces. Rostov has fisheries and market gardens. It is an icon-manufacturing center; makes candles, wax, tallow, linen, vinegar, soap, leather, white lead, treacle, and sweetmeats; p. 14,342.



*Christina Georgina Rossetti.*  
(Photo by Elliott & Fry.)

**Rostov-on-Don**, tn. of Don Cossacks territory, S. Russia. After Odessa it is the best-built city in S. Russia. It has a cathedral and a fine town hall (1897-99). There are large local fisheries. It exports cereals, wool and tallow. The port is ice free for 258 days a year. It was the scene of fighting in the World War; was capital of the Don Cossack Republic of White Russians, of brief existence; was occupied by the Germans in 1918; p. 20,864. Under the Soviet Five-Year Plan, Rostov became a key industrial center. In 1942 Rostov was once more in the territory attacked by the Germans.

**Rosyth Castle**, ruined castle (1561), on n. shore of Firth of Forth, Fifeshire, Scotland. Here the British Government acquired shore lands for a naval base, much used in the World War. The castle is connected by a causeway with the shore at low water. It is referred to in Scott's *Abbot*.

**Rota**, a court of appeal in the organization of the Vatican administration of justice, corresponding to a supreme court. The name may have come from the arrangement of judges' seats in the medieval court. The Council of Trent substituted committees of

cardinals, but in 1908 the ancient court was reestablished by Pope Pius x.

**Rotary Clubs**, community organizations established for the promotion of the highest ideals in business, the professions, and public service, created under a national and international association with which each club is affiliated and according to the standard pattern of the organization. Membership in each town or city is limited to one representative of each business, profession, or institution on the approved list. By weekly meetings the clubs promote good fellowship and lend their support to civic and national causes in accord with their aims. There are annual international conventions, with an attendance of 8,000 to 9,000 members and their families, representing the 5,000 clubs.

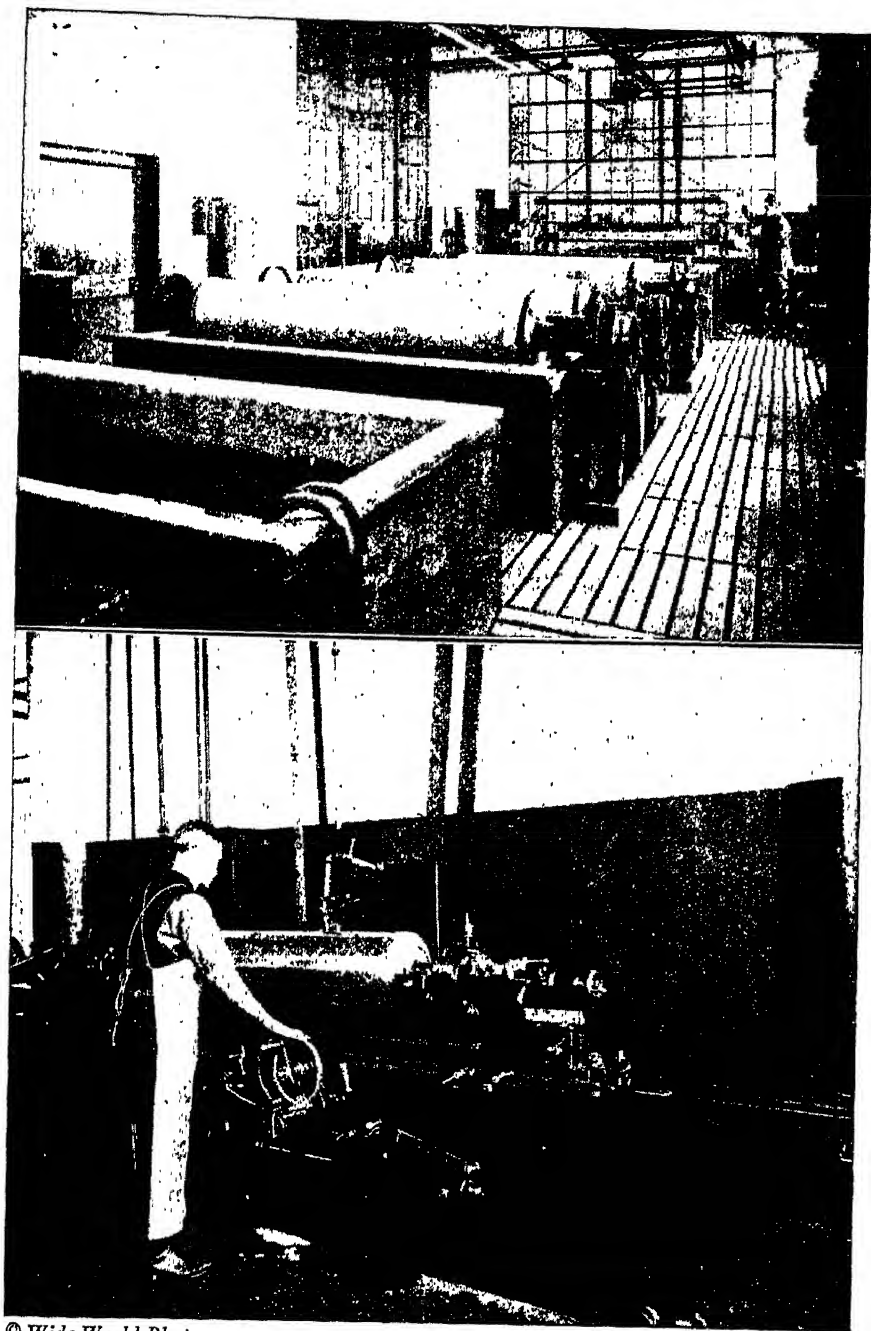
**Rotation of Crops** is the practice of growing different crops on the same fields from one season to another in a regular succession. This succession of crops allows a convenient arrangement of the farm work, tends to increase the fertility of the soil by the introduction of leguminous crops and green manuring, and conduces to the destruction of weeds and insects which may infest the land.

**Rotch, Abbot Lawrence** (1861-1912), American meteorologist, born in Boston, Mass., established at his own expense the Blue Hill Meteorological Observatory, Milton, Mass. He made the first measurements in America of the heights of clouds, and their



*Dante Gabriel Rossetti.*

velocities, and was the first to employ kites for suspending self-recording instruments in American meteorological experiments. His publications include: *Observations and Investigations at Blue Hill*, published since 1887 in



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*Rotogravure Process.*

Upper, Depositing Room; Lower, Rubber Impression-Cylinder Grinder.



*Annals of Harvard College Observatory, and Sounding the Ocean of Air* (1900).

**Roth, Frederick George Richard** (1872-1944), American sculptor, born in Brooklyn, N. Y. He began exhibiting in 1890, and has received medals and many prizes. He is particularly successful with wild animals, his latest works, shown at the N. Y. National Academy.

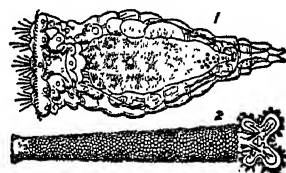
**Rothafel, Samuel L. (Roxy)** (1882-1936), American manager of motion picture theaters. His first enterprise was a small motion picture house in Forrest City, Pa., established at the end of seven years' service with the United States Marines, with which he had served in China during the Boxer Rebellion, and in San Domingo. His first large house was the Capitol in New York City, from which he moved to the Roxy Theater, thence to the Radio City Music Hall. Retiring from the latter in 1934 he established a theatre bearing his nickname in Philadelphia.

**Rothhorn**, the name of several lofty peaks in Switzerland. The Brienz-Rothhorn (7,715 ft.) is ascended by a mountain railway.

**Rothrock, Joseph Trimble** (1839-1922), American botanist, was surgeon and botanist to the U. S. Engineering Corps Exploring Expedition west of the 100th meridian, under Wheeler, in 1873-6, and was later professor of botany in the University of Pennsylvania. He was State Commissioner of Forestry for Pennsylvania from 1893 to 1905.

**Rothschild, Family of**, a famous family of bankers. It was founded by Mayer Anselm Rothschild (1742-1812), born in Frankfort, the son of a Jewish merchant. He opened a money exchange business in his native town and in 1803 loaned a large sum to the Danish government, thus starting business as an international financier. Mayer Anselm left five sons, whose influence speedily became recognized throughout the chancelleries of Europe, and few international loans were negotiated without their help. Nathan Mayer (1777-1836), the third son, went to England in 1797, and during the Napoleonic wars rendered invaluable financial assistance to Great Britain. Lionel Nathan (1809-79), son of Nathan Mayer Rothschild, was a member of Parliament and was notable for his part in securing Jewish emancipation in Great Britain. His son Nathan Mayer (1840-1915), created First Baron Rothschild in 1885, was distinguished for his philanthropy.

**Rotifera, Rotatoria, or Wheel Animals**, microscopic aquatic organisms, in which the anterior region of the body is furnished with cilia, whose movements produce the appearance of a rotating wheel. The body is divided into three regions—the head, bearing the wreath of cilia by means of which, in many cases, the animal swims, and which also serve to wash food into the mouth; the body, containing the viscera; and the 'foot,' by means of which the animal can attach itself, temporarily or permanently. There is a complete food-canal. The sexes are separate: but the males are few in number, short-



*Rotifera*

1. *Hydatina senta*. 2. *Meliceria ringens*.

lived, and much simpler in structure than the females, which during a large part of the year reproduce parthenogenetically.

**Rotogravure**, an intaglio printing process for reproducing photographic illustrations. The illustrations (and text) are engraved by the cross-line method on copper cylinders and the printing is done in a rotary press.

**Rotorua**, famous health resort and tourist center, New Zealand. It is situated in the hot-lake district, an extensive pumice plateau, nearly 1,000 m. in extent and about 1,000 ft. above sea-level, intersected by high igneous ranges, relieved by enormous trachytic cones, and dotted with beautiful lakes and luxuriant forests. Two miles distant is Whakarewarewa, with curative baths and a siliceous terrace from which rise large geysers to a height of from 20 to 100 ft.; p. 2,000.

**Rottenstone**, a light, porous, somewhat friable, siliceous rock, which is used largely for polishing surfaces of steel and other metals.

**Rotterdam**, chief seaport and second largest city, Netherlands, in the province of South Holland. By the Nieuwe Waterweg ('New Waterway') it has easy access to the North Sea, from which it is 20 m. distant. Along the river front stretches the beautiful quay known as the Boompjes. In the Grootte Markt, or Market Place, is a statue of Erasmus, whose birthplace still stands. Other fea-

tures of interest are Boyman's Museum, housing a collection of Dutch and Flemish masters, including Rembrandt, the brothers Maris, Cuyp, Franz Hals, Ruysdael, Bols, Maes, and Hobbema; the Groote Kerk, or Church of St. Lawrence, consecrated in 1477 and restored in 1912; the Old Town Hall, a seventeenth-century edifice; the Nautical Institute and Museum, and the Ethnographical and Maritime Museum. Rotterdam has a magnificent harbor with extensive docks and harbor works, and because of its strategic location commands not only a large maritime trade but an extensive river commerce as well. Grain, timber, metals, hardware, petroleum, drugs and chemicals, rice, coffee, tobacco and palm kernels are exported. Shipbuilding is an important industry. The name Rotterdam, which indicates that the town owes its origin to the building of a dyke or dam in the Rotte, first occurs about 1280. The 16th and 17th centuries were a period of great prosperity. Many quays and docks were constructed between 1850 and 1860; in 1863 the New Waterway through the Hook of Holland was begun. Large areas of the city were devastated by German air bombing in 1940; p. 612,000.

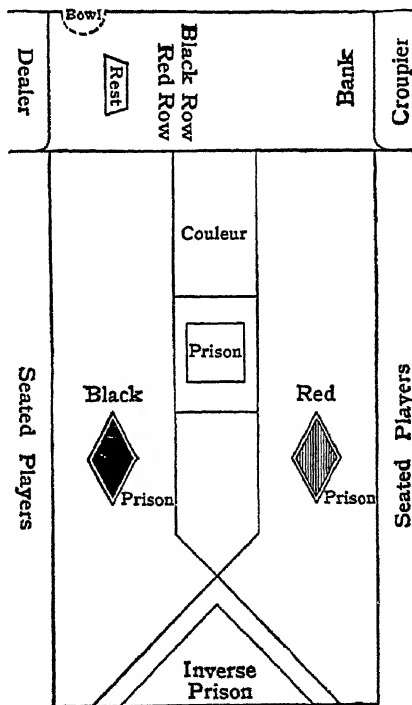
**Roubaix**, France, is the foremost woolen manufacturing town of France. The factories turn out goods—both in cotton and silk, besides wool—to the yearly value of over \$80,000,000. During the War it was in the hands of the Germans who pillaged the factories and blew up the railway station before they left, but since that time the town has made great progress towards recovery of its former prosperity; p. 117,209.

**Roubiliac, Louis François** (1695-1762), French sculptor, was born in Lyons. He settled in London about 1730 where his first notable production was a statue of Handel for Vauxhall Gardens (1738). Other well known works include the statue of Shakespeare in the British Museum (1758), that of Sir Isaac Newton at Cambridge (1755), and the Handel monument in Westminster Abbey.

**Rouble**, the Russian monetary unit, properly a gold or silver coin, now represented chiefly by a paper token. It is divided into 100 kopecks.

**Rouen**, town, France, capital of the department of Seine-Inférieure, on both banks of the Seine. It is a railway center, the chief cotton port of France, and the seat of an archbishop. The streets of the old town are narrow and picturesque, with timber-fronted

houses, and ennobled by some of the most beautiful churches in France. Chief of these are the cathedral (13th century onwards) which once possessed the heart of Richard Cœur de Lion (now transferred to the museum of antiquities); St. Maclou (15th century); St. Ouen (14th to 15th century), one of the most delicate and graceful of all Gothic churches; and St. Gervais, one of the oldest churches in France. The chief industry of Rouen is its cotton manufacture. There are also dyeworks, and manufactures of linen, wool, silks. Rouen was the ancient capital of Normandy. During the Great War it was a camp for reinforcements and had several base hospitals. Here Duke Rollo was buried, William the Conqueror died (1087), Joan of Arc was burned at the stake (1431), and Lord Clarendon died (1674). It is also the birthplace of La Salle (discoverer of the Mis-



Seated Players  
Rouge-et-Noir (Diagram of Half of Table).

sissippi), Corneille, and Gustave Flaubert: p. 122,898.

**Rouge**, ferric oxide,  $\text{Fe}_2\text{O}_3$ , obtained by calcining sulphate of iron. It is a fine, deep-

red powder used as a polishing agent for glass and metals. Rouge is also the name given to a cosmetic, in which a base, such as French chalk, with or without oil, is colored by the addition of extract of carthamin and cochineal or other red coloring matter. Liquid rouge is obtained from the making of carmine.

**Rouge-et-Noir**, a game at chance, also called 'trente-et-quarante', played on a large green table with six packs of 52 cards, which are counted out on the table by the dealer.

hawks. All have reddish mantles and legs characteristically feathered to the toes, which, with the beaks, are yellow.

**Rough Riders' Association**, an organization of members of the First Regiment, United States Volunteer Cavalry, which served in Cuba under Roosevelt, formed at the end of the Spanish-American War to perpetuate the experiences of the regiment. Membership is open to all members of the regiment and descends to the eldest son.

**Rouher, Eugène** (1814-84), French pub-



© Ewing Galloway, N. Y.

Rotterdam.

A Typical Row of Houses behind the Dyke.

It gets its name from the diamond-shaped red (rouge) and the black (noir) compartments of the gaming table.

**Rouget de Lisle, Claude Joseph** (1760-1836), French poet. While serving as a captain of engineers at Strassburg, during the night of April 24, 1792, he composed the words and music of *La Marseillaise*, the French national anthem.

**Roughleg**, a name given to four species of buzzard hawks of the genus *Archibuteo*. One is a native of the Pacific Slope, another species (*A. lagopus sanctijohannis*) is one of the largest and most striking of American

lic official, in 1849 became prime minister. As minister of agriculture (1855-63) he negotiated the Cobden treaty of 1860. He was one of the principal supporters of the imperial régime, and a large share of the responsibility for the Franco-German War rested with him. He fled to England after the fall of the empire, but returned to France in 1872 and was a member of the General Assembly as a Bonapartist.

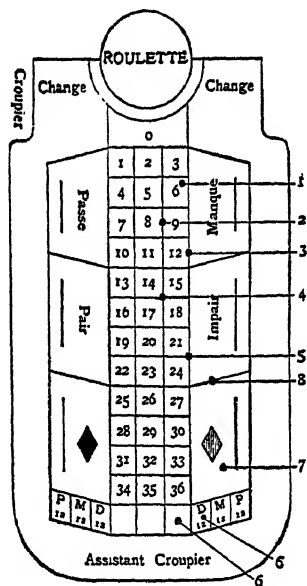
**Roulers**, town, Belgium, in West Flanders; famous for the manufacture of linen and cotton goods, lace, and silk ribbons. It was the scene of the victory of the French over

the Austrians on July 13, 1794, and in the Great War it was taken by the German forces in 1914, was under direct fire in November, 1917, and was retaken by the French in October, 1918; p. 26,657.

**Roulette**, a game of chance played with the aid of a wheel and a table marked with numbers and other divisions on both sides of a wheel, which is in the center. The wheel is a cylinder, the upper part of which is divided into 37 or 38 sections, each section corresponding to a number marked on the board. The cylinder is balanced on a pivot, and the croupier spins it. The cylinder revolves in a wooden frame shaped like a shallow basin. The croupier sends by a hand-throw a little ivory ball round the upper part of the basin. After describing an irregular course determined by the studs, it finally comes to rest and the croupier calls the number. At Monte Carlo the wheel has one 'zero' on it and thirty-six numbers from 1 to 36. The minimum stake at roulette at Monte Carlo is five francs. There are eight methods of staking, shown by the dots on the board.

(1.) *En plein*.—On one number; the bank pays thirty-five times the stake. (2.) *A cheval*.—On the line between any two numbers; the bank pays seventeen times the stake. (3.) *La transversale pleine*.—On the boundary line of any row of three numbers; the bank pays eleven times the stake. (4.) *En carré*.—On four figures. If one appears, the bank pays eight times the stake. (5.) *Transversale simple*.—On six figures; the bank pays five times

wagering on *pas* (19 to 36), *manque* (1 to 18), even (pair), uneven (impair), black and red. (8.) A stake can be placed *à cheval* between two neighboring



Roulette (Diagram of Half of Table).

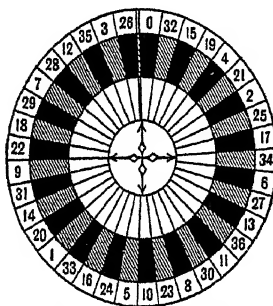


Diagram of Roulette.

the stake. (6.) On the first, middle, or last dozen, by placing the stake on the little square marked  $\frac{P}{12}$   $\frac{M}{12}$  or  $\frac{D}{12}$ ,

or on a column by placing the stake in the little space below the column. These are 2 to 1 chances. (7.) The even chances are

even chances. If both chances win, even money is paid. If one chance loses and one wins, the coup is without result. The zero is the great advantage that the bank has over the player. If zero appears, the player who has staked on an even chance has the choice between his stake being relegated 'to prison' until the next throw, or giving half his stake to the bank. The imprisoned stakes which are on the winning spaces when the next coup is made are set free; the bank takes the others. Half of stakes *à cheval* on even chances are fortified if the zero appears.

**Roumania**, or **Rumania**, an independent kingdom of Southeastern Europe, with Ukraine and the Black Sea on the east, and Hungary and Serbia on the west, Bulgaria on the south, and Hungary, Poland and Ukraine on the north. The area has varied in recent years. Prior to the Treaty of Bucharest (see BALKAN WARS), it was 50,720 sq. m. By additions of 1918-1920, it has also Bessarabia, 171,151 sq. m.; Transylvania, 23,792 sq. m.; Bukovina, 4,032 sq. m.; Crisana and Maramuresha, 8,566 sq. m.; and the Bar-

at, 7,102 sq. m. This makes its total area 113,886 sq. m., with a total population of approximately 18,000,000. Of these Roumanians by race number over 13,000,000.

The general configuration of the surface of Roumania proper is an irregular inclined plane, sloping by broad and gentle terraces from the Carpathians and the Transylvanian Alps to the north bank of the Danube, which for a considerable distance forms the boundary line between Bulgaria and Roumania. The climate of Roumania is one of marked extremes. The winters are bitterly cold and the summers almost sub-tropical. There is practically no spring, the severe cold of winter being followed by intense summer heat. The natural resources of Roumania include large tracts of woodland, valuable mineral deposits, and a soil of exceeding fertility. Forests cover 6,935,120 acres. The state owns nearly 3,000,000 acres of the forest lands, and privately owned forests are under government control. The mineral wealth includes rich petroleum springs, extensive coal fields, and deposits of lignite, salt, building stone, copper, iron, gold, lead, manganese, and quicksilver.

The rich Roumanian soil insures good harvests, and agriculture and kindred industries engage two-thirds or more of the population. There are some 450,000 acres devoted to vineyards and orchards. Tobacco is cultivated under the supervision of the state. Sheep, oxen and swine are reared. Manufacturing industries are not large. They depend chiefly on the local market. The great natural trade route is the Danube, the principal ports, Sulina and Constanta on the Black Sea Coast, and Galatz and Braila on the Danube. The great majority of the people belong to the Greek Orthodox Church. There are also Catholics and Protestants, Armenians, Jews, and Mohammedans. Only the Orthodox clergy are recognized by the state. Primary education is free and compulsory. There are two main universities (Bucharest and Jassy), with faculties in law, philosophy, science, medicine, and theology.

Roumania is a limited hereditary monarchy, with a constitution, on the Belgian model, dating from 1866. The executive power is vested in a council of eight ministers; the legislative power in a senate and chamber of deputies. This country was occupied in antiquity by a people called Getæ, and by the Dacians. Trajan transformed the country into a Roman province and it soon became a

flourishing part of the Roman empire. During the following thousand years the region was swept by successive barbarian invasions. Towards the end of the 14th century the independent states of Walachia and Moldavia were formed. Walachia was forced to recognize Turkish suzerainty in 1411. It regained its independence for a short time under Michael the Brave (1593-1601), who defeated the Turks at Calugareni (1595) and united under one sceptre Walachia, Moldavia, and Transylvania. Moldavia did not become the vassal of Turkey till a century later than Walachia (1513). Stephen the Great (1458-1504) is the hero of Moldavia, as Michael the Brave is of Walachia. During his long and glorious reign he defeated the Poles (1461), the Hungarian king, Matthias Corvinus, at Baja (1467), invaded Walachia, which he wished to unite with Moldavia, and inflicted a crushing defeat on the Turks at Rakova (1475).

During the next three centuries the ambitious designs of Russia and Austria towards the principalities became apparent. Austria deprived Moldavia of the province of Bukowina (Bucovina) in 1775, and Russia took away in 1812 the large province of Bessarabia. The Congress of Paris of 1856 declared the principalities to be neutral territories under the guarantee of the powers. In the Russo-Turkish War of 1877 Roumania assisted in the success of the Russian arms and on the battlefields of Bulgaria she won her independence, which was confirmed by the Congress of Berlin (1878). In 1881 Prince Charles was crowned king of Roumania (with a crown forged from the guns captured at Plevna). During the First Balkan War, Roumania maintained neutrality; in the Second, brought on by trouble over the division of the spoils, she allied herself with Greece and Serbia and secured as a result of her participation some 2,000 sq. m. of Northeastern Bulgaria.

Upon the outbreak of the Great War, Roumania adopted a policy of watchful neutrality to which she adhered during the latter months of 1914 and the year 1915. On Aug. 27, 1916, she entered the war on the side of the Allies. For a history of the ensuing struggle, see EUROPE, GREAT WAR OF: *Roumania*. Threatened with starvation, the exhausted country signed a three months' armistice on Dec. 10, 1917. A preliminary treaty was agreed to, March 5, 1918, and on May 6, 1918, the treaty of Bucharest was

signed. By treaties of 1919 and 1920, she obtained the additions of territory listed above. A Constitution of 1923 was adopted for all the national provinces. Carol II became king in 1930. In Feb., 1938, Carol assumed virtual dictatorship and suspended the Constitution. Roumania stood in a critical position in 1939. The Little Entente expired with the fall of Czechoslovakia; and the collapse of Poland left Roumania in the path of possible further German or Russian aggressions. In 1940, Carol abdicated and, under German pressure, Roumania ceded portions of her territory to Russia and Hungary. By 1941 the Nazis were in control of the country and Roumania was at war with Russia.

**Roumania: Language and Literature.** Roumanian is a Romance language. Its vocabulary contains a large admixture of Slavonic words, while Albanian, Turkish, Hungarian and French words have also been introduced. The oldest remains of the Roumanian literature consist almost exclusively of translations of the Bible and lives of the saints. More representative of the literature are the chronicles, composed from the beginning of the 17th century onward. A national literature in the general sense of the word, however, dates from the beginning of the 19th century. The pioneers of the national renaissance were George Asaki (1788-1869) in Moldavia, and Heliade Radulescu (1802-72) in Walachia. The Roumanian language possesses one of the richest and most beautiful collections of folk-songs and folk-lore in the world. These treasures were first collected in part by Vasile Alexandria (1821-90), a distinguished Roumanian poet. Among his most celebrated fellow-poets have been Bolintineanu (1826-72), Eminescu, Cosbuc, and Vlahuta.

Among the principal Roumanian historians were Balcescu (1819-52), Hasdeu, who was also the greatest philologist, Jorga, Tocilescu, and Xenopol. A great impulse in the development of the national literature was given by Titu Maiorescu in his critical essays, and by the foundation of the society Junimea, which grouped round its organ, *Convorbiri Literare* (appearing since 1866), the most talented of the young writers. The most important of these are Creanga (1837-89), a clever story-writer; Caragiale (b. 1852), the principal national dramatist; Veronica Micle (1853-89); and Jacob Negruzzi, Ganea, Slavici, Naum, Dui-liu, Zamfirescu, and Delavrancea.

**Roumanille, Joseph** (1818-91), Proven-

çal poet, entered the publishing business and, along with Mistral, devoted his life to the resuscitation of Provençal as a literary language. His *Noëls* breathe the pure faith of the people; while his prose tales often display a keen wit and shrewd humor.

**Round**, an early form of vocal composition, analogous to a canon, in that each performer takes up the melody at certain periods, but differing from it in being of a uniformly rhythmical construction, and in having the melody always sung at the same pitch or at the interval of an octave.

**Round, William Marshall Fitts** (1845-1906), American prison reformer and author. He engaged in journalistic work on the *Boston News*, *New York Independent*, and other papers. He also served as corresponding secretary of the N. Y. Prison Association (1883-1906); organized the Burnham Industrial Farm for unruly boys at Canaan, N. Y., and invented the 'Mills system' of awards, in use in many institutions.

**Roundheads**, a nickname given at the time of the rupture between Charles I and his Parliament to the supporters of the latter, who wore their hair cut short, in contradistinction to the cavaliers, or royalists, who wore theirs long.

**Round Robin**, a remonstrance or petition signed by a number of persons, generally in a circular form, so as to avoid giving prominence to any single name. The device is said to have been first used by the officials of the French government as a means of making known their grievances.

**Round Table.** The origin of this famous institution of King Arthur's court is a question much debated by scholars. Layamon, who lived on the Welsh border, in his translation of Wace, inserts a lengthy account of the founding of the Round Table. The whole tone and coloring of the story point to a very early date, while the tale as a whole finds more than one close and striking parallel in early Irish romance. The later prose romances tell us that Merlin made the Round Table, not for Arthur, but for his father, Uther Pendragon. The writer of the *Queste* states that the table was made by Merlin in remembrance of that of the Holy Grail, which itself was a copy of that at which Christ and His apostles partook of the last supper.

**Round Towers.** This term is restricted, in the archæology of the British Isles, to those ancient round towers which are peculiarly associated with Ireland, where over one hun-

dred specimens are still visible. Specimens may have been built, according to Dr. Petrie, as late as the 13th century, although he is of the opinion that most of them were erected from the 10th to the 12th century, while a few may be of 6th century origin. The date assigned by Irish annalists to one of them (that at Tomgraney, Co. Clare) is about 1005 A.D., being attributed to Brian Boromhe before his overthrow of the Danes. It is a vexed question as to what use these towers were put.

**Rousseau, Jean Jacques** (1712-78), French philosophic writer, was the son of a watchmaker at Geneva. Rousseau, having fled from his native town, was introduced to a Madame de Warens, who occupied a somewhat equivocal position as a pensioner of Victor Amadeus of Savoy and Sardinia, and agent for the conversion of Protestants to the Roman Catholic faith. By this woman Rousseau was sent to a seminary at Turin, where his 'conversion' was effected. Rousseau acquired powerful friends, and soon obtained the post of secretary to the French ambassador at Venice, where he lived for the best part of two years. On his return to Paris he became associated with Thérèse le Vasseur, a girl from Orleans, by whom he had five children, all of whom he sent to the foundling hospital. Rousseau's literary success began in 1750, when he was awarded by the Academy of Dijon a prize for an essay on the effect of the progress of science and art on morals; and in 1753 he brought out his successful opera, *Le Devin du Village*, and was equally successful with his *Discours sur l'Inégalité parmi les Hommes*, which may fairly be regarded as the popular gospel of the 'state of nature.' In the same year Madame d'Epinay, one of his great friends, lent him a cottage called 'The Hermitage,' on the borders of the forest of Montmorency, a few leagues from Paris. There he lived till the end of 1757, and in 1760-1 he published *Julie, ou la Nouvelle Héloïse*, *La Paix Perpétuelle*, and *Le Contrat Social*. On the appearance of his *Emile, ou de l'Éducation* in 1762 he was threatened by the Jesuits, and fled, first to Switzerland, subsequently to England, where he was the guest of Hume. At last he was permitted to return to France, where he died at Ermenonville. In England he had begun his remarkable *Confessions*. Rousseau's real strength lies in his style. An edition of his *Œuvres Complètes* was pub-

lished in 13 vols. in 1884-87; all his works have been published in English.

**Rousseau, Pierre Etienne Théodore** (1812-67), 'the father of modern French landscape,' born in Paris; exhibited his first work in the Salon of 1834—*Lisière d'un Bois Coupé*. His great work, *La Descente des Vaches*, was rejected in 1836 by the votes of the classic painters, and from that time till 1848 he was persistently refused. Others of his pictures were *The Chestnut Avenue*, *The Marsh in the Landes*; and after the reorganization of the Salon in 1848, he exhibited his masterpiece, *The Edge of the Forest*. Up to this period Rousseau had lived only occasionally at Barbizon, but in 1848 he took up his residence in the forest village, where he sent out landscapes which are now considered the *chefs d'œuvre* of French art. Fine examples of his work are in the Louvre and the National Gallery, London. His *Hoar Frost* is in a private collection at Baltimore; *The Gorges of Apremont*, in New York, and *Morning on the Oise* in Orange, N. J. Consult Sensier's *Souvenirs sur Théodore Rousseau*; D. C. Thomson's *The Barbizon School*; Gensel's *Millet and Rousseau* (1907).

**Roux, Pierre** (1853-1933), French bacteriologist, was born at Confolens in department Charente. After being assistant (1874-8) at the Paris Hospital, he became assistant at the Pasteur Institute on its foundation in 1888, vice-director on the death of Pasteur in 1895, and director in 1904. As early as 1888 he was successful, in conjunction with Yersin, in preparing the diphtheritic antitoxin serum.

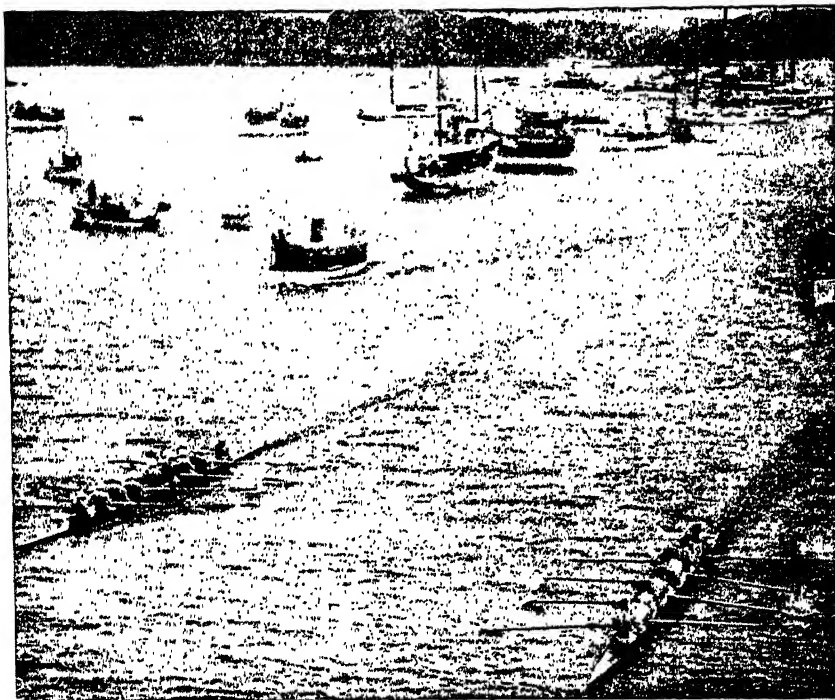
**Rowan, Stephen Clegg** (1808-90), American naval officer, was born near Dublin, Ireland. He was brought to the United States at an early age, and entered the U. S. Navy. He took part in the Mexican War, as executive officer of the *Cyane* in the capture of Monterey and San Diego. On the outbreak of the Civil War, he destroyed or captured the Confederate fleet in the Pasquotank River, assisted General Burnside in the capture of Winston, Newbern, and Beaufort, and he spent some arduous months at Charleston on the *New Ironsides*. He was subsequently commander of the naval station at New York (1872-9).

**Rowan Tree, Mountain Ash, or Quick-en Tree** (*Pyrus aucuparia* or *Sorbus aucuparia*), a tree belonging to the natural order Rosaceæ, abundant in Great Britain and in many parts of continental Europe. An allied

species is *P. americana*, a native of North America, with purple fruit.

**Rowing** is the propulsion of a boat by means of oars. A single row of oars was all that was attempted by the first shipbuilders; later, two and even four additional rows were added, as in the quinquereme of Rome and Carthage. Rowing as a sport may be dated from the early eighteenth century, when in 1715 one Doggett, a native of London, England, instituted a race to encourage good

erbocker and the *Invincible*. In 1834 was formed the first rowing association in the United States, the Castle Garden Amateur Boat Club, with a boat house at Castle Garden, N. Y. In 1837 was held the first Hudson River regatta. The Boston regatta of 1842 aroused much interest in the nearby colleges of Yale and Harvard. Harvard won the initial match between these great rivals in 1852. From 1870 to 1876 flourished the Rowing Association of American Colleges, which held



© Underwood.

#### Rowing.

#### Yale-Harvard Race at New London.

rowing among the Thames watermen. As early as 1829 the first inter-university contest took place at Henley, though the Henley races did not become an established annual institution until 1836. The Grand Challenge Cup at Henley, for eight-oared crews, is now the blue ribbon of the rowing world. The first foreign entry was made in the person of E. Smith, an American sculler, in 1872. The first race in America of which we have record was rowed in 1811, between the watermen of New York Bay and of Long Island Sound, in two four-oared barges, the *Knick-*

some notable regattas. In 1883 was organized the Intercollegiate Racing Association. The season of 1895 was a turning point in American college rowing. In that year Cornell, Columbia, and Pennsylvania fixed on the fine four-mile stretch of water on the Hudson River at Poughkeepsie as the future course for their races, and invited the world to row with them. In the same year Cornell sent an eight oared crew to Henley that was defeated, and in 1896 Yale was also defeated over the same course. In 1900 the crew of the University of Pennsylvania entered for



the Grand Challenge at Henley, and their showing was splendid. They defeated the London and Thames Rowing Clubs in the trials, and were defeated by Leander in the finals only after a glorious struggle. Since 1878 the dual meet between Yale and Harvard has been held at New London, Conn. Of late years school crews have attained distinction in the Henley races. The American Brown and Nichols crew of Cambridge, Mass. and the crew of Kent School, Conn. have both won the Thames Challenge Cup in England. Professional rowing flourished in the United States before the Civil War. The first championship races of this kind were rowed in 1837-8 between Stephen Roberts and Sidney Dorlan, both of New York. Dorlan won the first race, Roberts the second and third, and the fourth was ended by interference with the course from other boats. The five Ward brothers and three Biglin brothers were the most noted oarsmen of the late 'fifties and 'sixties, when professional sculling reached its greatest popularity.

**Rowland, Henry Augustus** (1848-1901), American physicist, professor of physics in Johns Hopkins University, which chair he retained until his death. To Professor Rowland are due many notable investigations in physics. He made an absolute determination of the ohm that helped to fix the value of this important electrical unit; and his work in spectroscopy, especially the spectrum of the sun, brought him an international reputation. His contributions in the fields of electricity and magnetism were hardly less noteworthy.

**Roxana**, daughter of a Bactrian chieftain. Alexander the Great married her in 327 B.C. In 311 Cassander put her to death.

**Royal Families of Europe.** The belief in divine right of kings has manifested itself perhaps more forcibly in modern times by the persistent practice of intermarriage among their relatives, until, at the time of World War I, nearly all of the royal houses of Europe were closely related by blood ties.

**Reigning Families.** — **BELGIUM.** — Upon the erection of the kingdom of Belgium in 1830, Leopold I was chosen as king, and his son Leopold II succeeded him in 1865, until his death in 1909. His nephew, Albert I followed. Albert I married Elizabeth of Bavaria. They had two sons and a daughter: Crown Prince Leopold (born 1901) married in 1926 Princess Astrid, daughter of Prince Charles, brother of King Gustaf V of Sweden;

en; offspring, Josephine Charlotte (born 1927), and Prince Baudoin (born 1930). On the death of Albert I (Feb. 17, 1934), Leopold III succeeded to the throne. In 1940 he became a prisoner in Germany.

**BULGARIA.** — King (tsar) Boris III, son of ex-king Ferdinand of Bulgaria. Boris was born in 1894 and succeeded on the abdication of his father in 1918. In 1930 he was married to Princess Giovanna, third daughter of Victor Emmanuel III of Italy; offspring: Marie Louise (1933). Boris died in 1943.

**DENMARK.** — King Christian X succeeded in 1912 on the death of his father, Frederick VIII. His grandfather, Christian IX, was father of the Empress Marie of Russia, wife of Emperor Alexander III of Russia and mother of Nicholas II; also of Alexandra, wife of Edward VII of Great Britain and mother of George V; his son, George, became King of the Hellenes in 1863, assassinated in 1913 and succeeded by his son Constantine. Christian X married Alexandrine of Mecklenburg; offspring: Crown Prince Frederick (born 1899) and Prince Knud (1900).

**GREAT BRITAIN.** — George V, son of Edward VII and grandson of Queen Victoria, succeeded on his father's death in 1910. His mother was the Danish princess, Alexandra. He married his cousin, Victoria Mary of Teck, in 1893. Of their five living children the eldest is the Duke of Windsor (1894) who upon his father's death in 1936 became King Edward VIII, and abdicated same year. He was succeeded by his next younger brother George VI (1895) who married, 1923, Lady Elizabeth Bowes-Lyon, daughter of the Earl of Strathmore and Kinghorne; offspring: Princess Elizabeth (1926) — heir to the throne, and Princess Margaret (1930). Other children of George V are: the Duke of Gloucester, married Lady Alice Montagu-Douglas-Scott; the Duke of Kent (died 1942) married to Princess Marina of Greece and father of a son and a daughter; and Princess Mary, wife of the Earl of Harewood and mother of two sons. George V was first cousin to the German ex-emperor, the last Russian emperor, the King of Denmark, the late King Constantine of Greece, and the King of Norway, who married his sister Maud. George V was also first cousin to ex-queen Victoria of Spain, to the late queen Marie of Roumania and to the late crown princess of Sweden. Edward VIII on his abdication became Duke of Windsor. In 1937 he married Mrs. Wallis Warfield Simpson, an American, at Monts, France.

ITALY.—Victor Emmanuel III, born in 1869, is grandson of Victor Emmanuel II and son of Umberto (assassinated in 1900) and Margherita of Savoy. He married Helena, daughter of the late King Nicholas of Montenegro. They had four daughters and a son Umberto, the crown prince, who married, in 1930, Princess Marie José of Belgium.

NETHERLANDS.—The queen of Holland, Wilhelmina, born in 1880, daughter of William III and Emma, daughter of Prince George Victor of Waldeck-Pyrmont. In 1901 she married Prince Henry of Mecklenburg-Schwerin, who died, 1934; offspring: daughter, Juliana (1909), who married, 1937, Prince Bernhard von Lippe-Biesterfeld and is mother of three girls.

NORWAY.—On the separation of Norway from Sweden in 1905, Charles of Denmark, second son of the late King Frederick VIII, was chosen to the throne, as the first king of Norway. He was crowned as Haakon VII. In 1896 he married Maud, third daughter of Edward VII of England. He thus became the brother-in-law of his cousin George V. Constantine of Greece was also a cousin. Olaf, his son, was born in 1903 and married in 1929 to Princess Märtha, daughter of Prince Charles, brother of the King of Sweden.

SWEDEN. — The royal house of Sweden traces its origin to Marshal Bernadotte, who became king of Sweden in 1818. The present king, who is Gustavus V, is a great-grandson of Napoleon's famous marshal, and was born in 1858. He is a son of Oscar II and Sophie of Nassau. In 1881 he married Princess Victoria of Baden, a daughter of the only sister of William I of Germany, who died in 1930. The Crown Prince, Gustavus Adolphus, was born in 1882, and married in 1905 to Margaret of Connaught, granddaughter of Queen Victoria, and own cousin of the King of England and the Queen of Norway. Margaret, who bore four sons and one daughter, died in 1920. Subsequently the Crown Prince married (1923) Lady Louise Mountbatten, also of the British Royal Family. His eldest son, Prince Gustaf Adolf (born 1906) married (1932) Princess Sybille of Saxe-Coburg-Gotha, a great-granddaughter of Queen Victoria.

*Former Reigning Families.* — AUSTRIA-HUNGARY.—Charles I, former emperor of Austria and king of Hungary, was the grand-nephew of the late Francis Joseph I, whom he succeeded on the throne in 1916, and nephew of Francis Ferdinand, whose assassination

at Sarajevo in 1914 brought on the war. The former emperor was the eldest son of Archduke Otto, younger brother of Francis Ferdinand, and of Archduchess Maria Josepha, sister of the ex-king of Saxony. He was married in 1911 to Princess Zita of Bourbon Parma, daughter of Duke Robert of Parma, and a younger sister of the first wife of Ferdinand, ex-tsar of Bulgaria. They had five children, the eldest being Francis Joseph Otto, born in 1912. In November, 1918, Austria and Hungary were proclaimed independent republics, and Charles went into exile. After two fruitless visits to Hungary (1921) he retired to Madeira where he died in 1922.

BAVARIA.—The former king was Louis III, who in 1913 succeeded his insane cousin Otto, younger brother of Louis II, to whom the unfortunate title of 'mad king of Bavaria' was applied. He was married to the Archduchess Maria Theresa of Austria-Este, and had six daughters and three sons, the eldest being Rupert, who was born in 1869, and who married his cousin Marie Gabriele. The dynasty was deposed in November, 1918, and Bavaria was declared a republic. Louis died in 1921.

GERMANY.—The German ex-emperor and ex-king of Prussia, William II, traced his ancestry back to Frederick of Hohenzollern, a member of a noble German family in 980. William II was born in 1859, a grandson of William I, the first German emperor, and a son of Frederick III. His mother was Victoria, the eldest daughter of Queen Victoria of England, and sister of Edward VII. William II married Augusta Victoria of Schleswig-Holstein-Sonderburg-Augustenburg, by whom he has had six sons and one daughter. On the death of the ex-Kaiserin in 1921 (April), William II married (November) Princess Hermine of Schönaich-Carolath (née of Reuss). His eldest son, Frederick William, born in 1882 and married (1905) to Cecilie of Mecklenburg-Schwerin, was the crown prince. The eldest son of Frederick William, William Frederick, was born in 1906. The daughter of William II married the duke of Brunswick, grandson of George V of Hanover.

GREECE.—The king of Greece was Constantine I, born in 1868. He married (1889) Sophie, sister of the German ex-emperor, by whom he had five children. Upon the assassination of his father, George I, in 1913, Constantine succeeded to the throne, but abandoned it to his son, Alexander, in 1917. After the death of Alexander in 1920 he was recalled to the throne by a plebiscite. Con-

stantine was forced to abdicate again, however, in 1922, in favor of his second son, George II, who, when a republic was set up, relinquished the throne in less than a year. Constantine died in 1923. He was the first cousin of the emperor of Russia, of the king of Great Britain and of the king of Denmark. George II returned to the throne, 1935.

**MONTENEGRO.**—The last ruler was Nicholas I, born in 1841, and proclaimed prince of Montenegro in succession to his uncle Danilo in 1860. He assumed the title of king in 1910. Prince Danilo Alexander, born 1871, was heir-apparent but, upon the death of King Nicholas in March, 1921, Montenegro became a part of Yugoslavia.

**ROUMANIA.**—Carol II, who became king in 1930, son of Ferdinand I and Queen Marie (daughter of the Duke of Edinburgh, afterwards Duke of Saxe-Coburg-Gotha), is thus a great-grandson of Queen Victoria of Great Britain. He was born in 1893, married in 1921 to Princess Helen of Greece (divorced 1928); offspring, Crown Prince Michael (Michael), born 1921. In 1940 the Germans forced the king to abdicate and he fled from the country.

**RUSSIA.**—Nicholas II, last tsar of Russia, was born in 1868, a descendant of Michael Romanoff, who founded the dynasty in 1613. Nicholas was the son of Alexander III and Dagmar of Denmark (sister of the late Alexandra of England, the late Frederick VIII of Denmark, and the late George I of Greece), and was therefore first cousin to the king of England, the king of Denmark, and the king of Greece. He married Alexandra Alice, daughter of the Grand Duchess of Hesse (formerly Princess Alice of England), and had five children. Nicholas abdicated both for himself and his only son Alexis in March, 1917, and in 1918 the entire family was murdered by the Bolsheviks. Later a young woman who claimed to be Princess Anastasia, and to have survived the Bolshevik attack, visited the U. S. and gained some following, though she was denied recognition by relatives of the late Tsar. Grand Duchess Marie, daughter of the late Grand Duke Paul of Russia, and cousin of the late Tsar Nicholas became employed in a New York City Fifth Ave. shop as buyer and designer of novelty articles. Formerly a member by marriage of the royal family of Sweden, she lived for nine years in Paris where she operated an embroidery factory to give employment to exiled Russians.

**SAXONY.**—The last king of Saxony was Frederick August III, his ancestor in 1806 assumed the title of King of the Electorate of Saxony, and an earlier ancestor was emperor of Germany. He married Louise of Tuscany in 1891 (the marriage was dissolved in 1903), by whom he had six children. George, born in 1893, was the crown prince. On November 9, 1918, Saxony was declared a republic.

**SPAIN.**—The last king of Spain was Alfonso XIII of the family of Bourbon, and a descendant of Louis XIV of France. The only son of Alfonso XII and Maria Christina, daughter of the late Charles Ferdinand, Archduke of Austria, he was born in 1886. He married (1906) Victoria Eugenie, daughter of Princess Beatrice of England (Queen Victoria's youngest daughter) and Prince Henry of Battenberg. Six children were born of this marriage, the eldest in 1907. Alfonso withdrew to France when a Spanish republic was established in 1931.

**WÜRTTEMBERG.**—The ex-king was William II, who was born in 1848, and succeeded to the throne on the death of his cousin, Charles I in 1891. He had been married twice, but had no male descendants. His cousin Albert, born in 1865, was heir-presumptive until 1918, when Württemberg was proclaimed a republic. He died in 1921.

**YUGOSLAVIA.**—Crown Prince Peter was proclaimed king, Oct., 1934, under a regency of three following the assassination of his father, King Alexander. His mother is Marie, second daughter of King Ferdinand of Roumania, to whom were born Prince Peter (1923), Prince Tomislav (1928) and Prince Andreja (1929). In World War II the monarchy was overthrown and a republic established.

**Royall, Isaac** (c. 1719-81), was born in Antigua, West Indies and later moved to Medford, Mass. Adhering to the royalist side in the Revolutionary War, he had to leave the country (1775). Although his large estates were confiscated, he bequeathed 2,000 acres to endow a chair of law at Harvard University.

**Royal Society of London**, the oldest scientific society in Great Britain, was founded in 1660, though the nucleus of the organization was formed fifteen years earlier by a number of learned men who met in London to discuss philosophical questions and report experiments. Sir Robert Moray was the first president of the Society, and Sir Christopher Wren and the Hon. Robert Boyle were among

director until 1867. As a composer, Rubinstein has written largely in nearly every branch of music. He was an extreme anti-Wagnerian, and his style displays the influence of Schubert and Mendelssohn to a marked degree. Of his symphonies, the *Ocean* and *Dramatic* are perhaps best known; but many of his compositions for piano, some of his chamber music, and a great number of his songs are highly esteemed.

**Rubus**, a genus of shrubs and herbs belonging to the order Rosaceæ. They bear mostly panicles or corymbs of white or pink flowers, followed by often edible fruits. Among the edible-fruited species are *R. Idæus*, the red raspberry.

**Ruby**, a red variety of precious corundum,  $Al_2O_3$ , which differs from sapphire only in its color. It is strongly dichroic, and this property is useful for distinguishing it from garnet, spinel, and red paste; while its specific gravity (4) is higher than that of red tourmaline, and in hardness (9) it is inferior only to the diamond. The most precious of all is the bright carmine red, known as the 'pigeon-blood' color. Large rubies are excessively rare. These gems are obtained principally from Upper Burma, Siam, and Ceylon. 'Reconstructed rubies' are obtained by melting small rubies in an electric furnace and then allowing them to cool very slowly.

**Ruckstuhl, Frederick Wellington** (1853-1942), American sculptor, born at Breitenbach, Alsace; educated in St. Louis, Mo., where his parents settled in 1854. His female marble figure *Evening*, received honorable mention at the Salon of 1888, and later a grand medal at the Chicago World's Fair in 1893. It is now in the N. Y. Metropolitan Museum. Among his other important works are the bronze *Victory on the Soldiers'* and *Sailors' monument* in Jamaica, N. Y.; marble figures of *Wisdom* and *Force* for the appellate court, New York city.

**Rudbeck, Olof** (1630-1702), Swedish author and scientist, born at Westerås. At the age of twenty-three he discovered the lymphatic vessels; was professor of practical medicine at Upsala (1660), where he founded a botanical garden and edited a herbarium entitled *Campus Elysium* (1701-2). His chief work, however, was his *Atlantica* (1675-98), in which, with immense erudition and extraordinary ingenuity, he endeavored to prove that Plato's *Atlantis* was really Sweden, and that Sweden was the cradle of human culture.

**Rude, François** (1784-1855), French

sculptor, born at Dijon. His chief work is the fine trophy on the Arc de Triomphe de l'Etoile. He broke with academic traditions, and turned to living nature for his inspiration and models. His best work is found in the Lille and Dijon museums, at Versailles, and in the Luxembourg Gardens at Paris.

**Rudolf I.** (1218-91), German emperor, was elected in 1273. In 1278 he defeated and killed Ottocar, the powerful Bohemian king who held Austria, Styria, Carinthia, and Carniola. This victory proved to be the foundation of the future greatness of the house of Hapsburg.

**Rudolf II.** (1552-1612), German emperor, was the son of Maximilian II., and became emperor in 1576. Weakness was the most conspicuous feature of Rudolf's character. In 1606 the Hapsburg archdukes set up Matthias, the emperor's brother, as head of the family, and compelled Rudolf to resign all his dominions except Bohemia. In 1611 Matthias seized Bohemia.

**Rudolf or Rudolph, Franz Karl Joseph** (1858-89), crown-prince of Austria-Hungary, only son of the Emperor Francis Joseph. It is generally believed that he committed suicide over a love affair at Meyerling, near Vienna.

**Rue** (*Ruta graveolens*), a perennial evergreen herb, whose leaves were formerly occasionally used for flavoring and in medicine. It was the herb of repentance and the herb of grace. It bears greenish-yellow flowers, and the leaves have a powerful smell.

**Rueda, Lope de** (d. c. 1567), Spanish actor and dramatist, and one of the founders of the Spanish secular stage, born at Seville. He first popularized the true drama in Spain, and wrote his own plays, mostly from Italian stories. But his most famous works are short humorous dialogues or interludes, called *pasos*.

**Ruff** (*Macetes pugnax*), a bird of the far north, more common in northern Europe than America, and a near ally of the sandpipers. In the spring the male loses the feathers on the face, which are replaced by yellowish or pinkish tubercles; curled tufts of feathers also arise near the ears, and later the shield-like ruff is developed.

**Ruffe, or Pope** (*Acerina cernua*), a small fresh-water perch, found in sluggish streams throughout central Europe, and common in many parts of England.

**Ruffin, Edmund** (1794-1865), American agriculturist, born in Prince George co., Va. In 1832 he founded the *Farmer's Register* and

edited it until 1841. He fired the first shot opening the siege of Fort Sumter (April 12, 1861), and at the close of the Civil War killed himself rather than swear allegiance to the Union.

**Rugby**, Warwickshire, England, on the Avon. The church of St. Andrew replaces an older one, mostly demolished in 1777. Public buildings include the famous school, founded in 1567 by Lawrence Sheriff. Dr. Arnold was headmaster (1828-42), and among many memorials in the chapel are effigies of Dr. Arnold and Dean Stanley; p. 23,824.



*Photo by Elliott & Fry.  
Rubinstein.*

**Rügen**, German island in Baltic; p. c. 48,000. The soil is fertile, and agriculture, cattle raising and fisheries flourish. Bergen is the capital.

**Ruger, Thomas Howard** (1833-1907), American soldier, born at Lima, N. Y.; became a brigadier-general. He fought at Chancellorsville and Gettysburg; assisted in suppressing the draft riots in New York city; and was provisional governor of Ga. in 1868. In 1871-76 he was superintendent of West Point.

**Ruggles, Charles** (1892- ), actor, was born in Los Angeles, Calif. He was educated in the public schools and made his first appearance in a stock company at the Alcazar Theater, San Francisco, 1908. He is popular in motion picture films and has appeared in many character parts. He is a recognized

champion handball player, an expert swimmer, and boxer.

**Ruggles, Samuel Bulkley** (1800-80), American lawyer, born in Conn., began to practise law in New York in 1821. He was a member of the legislature in 1838, and in 1840 and 1858 was president of the canal board. He was an authority on financial and statistical subjects, and represented the U. S. in the international monetary conference at Paris.

**Rugs**. Most of the Oriental rugs sold in the United States come from Persia, Russia and Turkey. A few come from India and China and some are woven in Beluchistan and Afghanistan. The Ballard collection in the Metropolitan Museum of Art, New York, is notable. Everywhere the method of weaving is practically the same. The warp threads are stretched vertically between two rollers. The pile is formed by the ends of rows of woolen knots tied to the warp between weft threads that bind them in place. An aniline-dyed Oriental rug is of little value as the life has been taken from the wool and the colors grow harsh with age instead of softening and blending into quaint and curious harmonies as do vegetable colors. The principal centers of rug-weaving Persia are Tabriz and Sultanabad, where the industry is under European control. Tabriz rugs excel in fineness of weave and intricacy of design. The colorings are exquisitely delicate and the patterns brilliantly harmonious. Other rugs of Northwestern Persia are Gorevans, Serapes, Bakshaishes, and Herezes. Among rugs woven in Western Persia are Sultanabads, Fereghans, Hamadans, Schnas, Serebends, Kurdistans and Saruks. The high reputation of Kerman rugs is due partly to the quality of the wool of South Central Persia. The principal types of rugs woven in the Caucasus are Daghestans, Kabistans, Derbends, Chichis, Shirvans, Kazaks, Guerres and Karabaghs. Rugs woven in Russia east of the Caspian along the line of the Transcaspian railway are Tekkes, Yomuds, Khivas, Bokharas, Afghans and Samarkands. The most important center of rug weaving in Turkey is Oushak. The industry is under European control and large, thick rugs in Persian, Turkish and European designs are woven under the names Kerman, Ghiordes, Yaprak, Sparta, Gulistan, Enlie, etc. The colors are strong greens, green-blues, reds and maroons. Anatolia is another name for Asia Minor. Under the name Anatolians are sold small odds and ends of every

variety of Turkish weave. A century ago small prayer rugs were woven at Anatolian cities, which are unsurpassed by the best Persians and which are the most cherished pieces in museums and private collections. The modern reproductions of them are inferior in quality. Consult Lewis, *Practical Book of Oriental Rugs*.

**Ruiz, Juan** (fl. 14th century), Spanish poet, sometimes called the Spanish Rabelais, but more commonly known as the arch-priest of Hita, was a type of the free-living, coarse-spoken priest of his time. In prison at Toledo he wrote his famous poem, *El Libro de los Cantares*, a set of songs, free, vivacious, and full of coarse wit.

this rule is reversed: turn left on meeting, right to pass. If a person driving at a slow pace is overtaken by another driving at a faster pace within local speed regulations, the first person is bound to give way for the other to pass, if he is so requested. A person is not bound to look back for overtaking vehicles, and is not bound to keep to the right of the center of the road except to allow others to pass. Failure by drivers to observe the rules of the road is presumptive evidence of negligence. This applies also to violation of local regulations as to speed, separation of heavy and light traffic, etc.

By international agreement, in order to avoid collisions, sea-going vessels are required



Rugby School.

Left, The Quad Gate; Right, The School and Chapel from the Close.

**Rule Nisi.** A direction that some particular act be allowed unless good cause to the contrary be shown. A decree *nisi* is a provisional decree, made absolute within a specified time unless cause against it is shown.

**Rule of Faith** (*Regula Fidei*), a concise summary of the apostolic teaching as contained in the New Testament and in the tradition of the earliest churches.

**Rule of the Road.** There are three sources of the law of the road on land, statutes, municipal ordinances, and the common law. Special provisions in regard to automobiles and bicycles are contained in the statutes of most states. The first rule of the road is that persons driving along a public highway must turn to the right of the center of the road upon meeting another person coming from the opposite direction and in overtaking another a vehicle should go left. In Britain

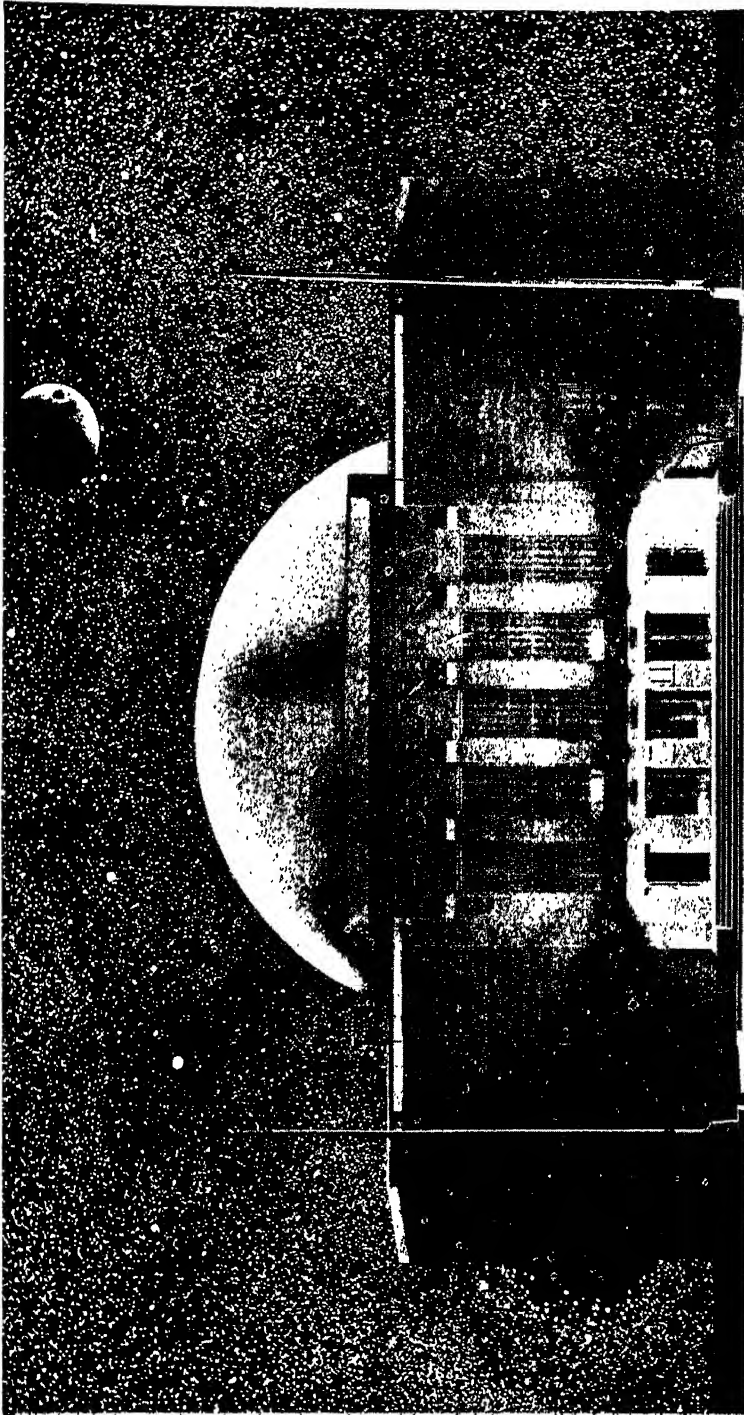
when under way—(a) to carry certain light and signal apparatus; (b) to proceed in accordance with certain rules; (c) to make certain signals. Steam vessels must keep out of the way of sailing vessels.

**Rum**, an ardent spirit, obtained by fermenting molasses, distilling the wash, and storing the distillate for at least two years in order to mature and improve it by the formation of esters, which give the rum a fine, soft, mellow flavor. The dark color is due to the addition of burnt sugar. The best natural product is imported from Jamaica, Demerara, and Martinique.

**Rumex**, a genus of mostly herbaceous plants, belonging to the order Polygonaceæ. Among the species are the broad-leaved dock (*R. obtusifolius*), the canaigre (*R. hymenosepalus*), which furnishes tannin in its roots; the common sorrel (*R. acetosa*), and the sheep's sorrel (*R. acetosella*).

## Rulers of the World

Country	Name of Ruler, Etc.	Access'n
Afghanistan.....	Mohammed Zahir Khan, <i>King</i> .....	1933
Arabia—Saudi.....	Abd-el-Aziz es Saud ibn Saud, <i>King</i> .....	1926
Argentina.....	Gen. Edelmiro Farrell, <i>President</i> .....	1944
Australia.....	The Duke of Gloucester, <i>Governor-General</i> .....	1945
.....	Joseph Chifley, <i>Premier</i> .....	1945
Austria.....	Leopold Figl, <i>Chancellor</i> .....	1945
Belgium.....	Leopold III, <i>King</i> .....	1934
Bhutan (Br. Protectorate).....	Jig-me Wangchuck, <i>Maharajah</i> .....	1926
Bolivia.....	Maj. Gualberto Villarroel, <i>President</i> .....	1944
Brazil.....	Gen. Eurico Dutra, <i>President</i> .....	1945
Bulgaria.....	Simeon II, <i>Czar</i> .....	1943
Canada.....	Field Marshal R. L. G. Alexander, <i>Governor-General</i> .....	1945
.....	W. L. MacKenzie King, <i>Premier</i> .....	
Chile.....	Juan Antonio Rios, <i>President</i> .....	1942
China.....	Chiang Kai-shek, <i>Acting President</i> .....	1943
Colombia.....	Alberto Lleras Camargo, <i>President</i> .....	1945
Costa Rica.....	Teodoro Picado, <i>President</i> .....	1944
Cuba.....	Dr. Ramon Grau San Martin, <i>President</i> .....	1944
Czechoslovakia.....	Eduard Benes, <i>President</i> .....	1935
Denmark.....	Christian X., <i>King</i> .....	1912
Dominican Republic.....	Rafael Trujillo, <i>President</i> .....	1942
Ecuador.....	Jose Maria Velasco Ibarra, <i>President</i> .....	1944
Egypt.....	Faruk I., <i>King</i> .....	1936
Eire (Irish Free State).....	Sean T. O'Kelly, <i>President</i> ; Eamon de Valera, <i>Prime Minister</i> .....	1945
Finland.....	Field Marshal Baron Carl Gustav Mannerheim, <i>President</i> .....	1944
France.....	Gen. Charles de Gaulle, <i>President of Council</i> .....	1944
Germany.....		
Great Britain.....	George VI., <i>King and Emperor</i> ; Clement R. Attlee, <i>Premier</i> .....	
Greece.....	Archbishop Damaskinos, <i>Regent</i> .....	1944
Guatemala.....	Dr. Juan Jose Arevalo, <i>President</i> .....	1945
Haiti.....	Elie Lesoot, <i>President</i> .....	1941
Honduras.....	Gen. Tiburcio Carias Andino, <i>President</i> .....	1933
Hungary.....	Zoltan Tildy, <i>Premier</i> .....	1945
Iceland.....	Sveinn Bjornsson, <i>President</i> .....	1944
India (British).....	Field Marshal Sir Archibald Percival Wavell, <i>Viceroy</i> .....	1943
Iran (Persia).....	Mohammed Riza Pahlevi, <i>Shah</i> .....	1941
Iraq (Mesopotamia).....	Feisal II, <i>King</i> .....	1939
Italy.....	Alcide de Gasperi, <i>Premier</i> .....	1945
Japan.....		
Liberia.....	William V. Tubman, <i>President</i> .....	1943
Liechtenstein.....	Franz Joseph II, <i>Prince</i> .....	1938
Lithuania.....		
Luxemburg.....		
Mexico.....	Manuel Avila Camacho, <i>President</i> .....	1940
Monaco.....	Louis II., <i>Prince</i> .....	1922
Morocco.....	Moulay Mohammed, <i>Sultan</i> .....	1927
Nepal.....	Tribhubana Bir Bikram, <i>Shah</i> .....	1911
Netherlands.....	Wilhelmina, <i>Queen</i> .....	1890
Newfoundland.....	Vice-Adm. Humphrey T. Walwyn, <i>Governor</i> .....	1936
New Zealand.....	Sir Cyril L. N. Newall, <i>Governor-General</i> ; Peter Fraser, <i>Premier</i> .....	1941
Nicaragua.....	Gen. Anastasio Somoza, <i>President</i> .....	1937
Norway.....	Haakon VII., <i>King</i> .....	1905
Oman.....	Seyyid Said ibn Taimur, <i>Sultan</i> .....	1932
Palestine.....	Lt. Gen. Sir Alan Gordon Cunningham, <i>High Commissioner</i> .....	1945
Panama.....	Enrique A. Jiminez, <i>President</i> .....	1945
Paraguay.....	Higinio Morinigo, <i>President</i> .....	1940
Persia (Iran).....	Mohammed Riza Pahlevi, <i>Shah</i> .....	1925
Peru.....	Jose Rivero, <i>President</i> .....	1945
Philippine Islands.....	Sergio Osmena, <i>President</i> .....	1945
Poland.....	Stanislaw Mikolajczyk, <i>Premier</i> .....	1944
Portugal.....	Gen. Antonio Oscar de Fragoso Carmona, <i>President</i> .....	1926
Roumania.....		
Russia (U. S. S. R.).....	Mikhail I. Kalinin, <i>Chairman</i> ; Joseph Stalin, <i>Premier</i> .....	1938
El Salvador.....	Gen. Salvador Castro, <i>President</i> .....	1945
Siam.....	Ananda Mahidol, <i>King</i> .....	1933
Sudan, Anglo-Egyptian.....	Lt. Gen. H. J. Huddleston, <i>Governor-General</i> .....	1940
South Africa, Union of.....	Maj. Gideon Brand van Zyl, <i>Governor-General</i> ; Jan Christian Smuts, <i>Premier</i> .....	1945
Spain.....	Gen. Francisco Franco, <i>Head of Government</i> .....	1939
Sweden.....	Gustaf V., <i>King</i> .....	1907
Switzerland.....	Dr. Karl Kobelt, <i>President</i> .....	1945
Syria (French Mandate).....	Shukri bey al-Quwatli, <i>President</i> .....	1941
Trans-Jordan.....	Abdullah, <i>Emir</i> .....	1921
Tunisia.....	Sidi Lamine, <i>Bey</i> .....	1943
Turkey.....	Ismet Inonu, <i>President</i> .....	1938
United States.....	Harry S. Truman, <i>President</i> .....	1945
Uruguay.....	Juan Jose de Arceaga, <i>President</i> .....	1942
Vatican City, State of.....	Pius XII., <i>Pope and Sovereign</i> .....	1939
Venezuela.....	Romulo Bettancourt, <i>Provisional President</i> .....	1945
Yugoslavia.....	Republic established.....	1945
Zanzibar.....	Seyyid Khalifa ibn Harub, <i>Sultan</i> .....	1911



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The Hayden Planetarium of New York, the treasure house of the stars, the theatre of sky magic, where those who wish to study the planets may witness the wonders of the UNIVERSE.



**Rumford, Benjamin Thompson, Count** (1753-1814), American scientist, taught school in Rumford (Concord), N. H. He was acquitted after trial on charges of disloyalty, and went to England in 1776. In 1781 his property was confiscated. He was received with much favor in England and continued his scientific studies and made valuable experiments with explosives. In 1785 he became aide-de-camp and chamberlain to the Elector of Bavaria. In 1791 he was invested with the rank of a Count of the Holy Roman Empire, and chose the title of Rumford, after the little New Hampshire town in which he had taught school. He gave a large sum to Harvard to found the Rumford professorships in science.

**Rumsey, James** (1743-92), American mechanical engineer, born in Bohemia Manor, Cecil co., Md. In 1784, while engineer in a mill at Shepherdstown, Va., he became interested in Watt's steam engine, and applied it to the propulsion of a boat. The Rumsey Society was formed in Philadelphia to aid him in his experiments, and he went to England, where a similar society was formed to aid him construct an ocean-going steamer, but died there while conducting further experiments. He was author of *A Short Treatise on the Application of Steam* (1788).

**Runciman, Walter** (1870- ), British shipping magnate and financier. He has occupied several cabinet posts and became President of the Board of Trade under the MacDonald coalition government.

**Runes.** The Gothic word *runa* or *run*, originally denoted something occult or cryptic, and early became a synonym for knowl-

the Futhorc from the first six letters, 'th' being but one. Extant runes are mostly inscribed on stones.

**Runner** is the name given to a slender prostrate branch of a plant, from which branch leaves and roots proceed at each node. A good example is the strawberry plant.

**Runnymede**, meadow where King John is reputed to have signed Magna Charta on June 15, 1215.

**Rupee**, the unit of value in British India. Its value in English money necessarily varies with the price of silver. In normal times it is worth 1s. 4d. British money, or about 28 cents U. S.

**Rupert, Maria Luitpold Ferdinand** (1869), Crown Prince of Bavaria, was born in Munich. He was educated at the University of Munich and at the outbreak of the Great War in Europe became commander of the Fifth German Army.

**Rupert, Prince** (1619-82), nephew and general of Charles I. of England, was the son of Elizabeth (daughter of James I.) and of Frederick v., Elector Palatine, king of Bohemia, and was born at Prague. He was employed (1642-6) by Charles I. In 1673 he became Lord High Admiral and conducted three furious fights off the Dutch coast in that year. In 1670 Rupert became first governor of the Hudson's Bay Company. His last ten years were spent in retirement in the pursuit of chemical, physical, and mechanical researches.

**Rupert's Land**, former designation of the territory of North America drained by rivers entering Hudson Bay. It was granted to the Hudson's Bay Company in 1670 through the efforts of Prince Rupert. The lands are now included in the Northwest Territories and the province of Manitoba.

**Rural Credits.** The agricultural or rural credits movement embraces numerous and various plans for aiding American farmers by loans of money. Federal legislation upon rural credits embraces the *Federal Farm Loan Act* of July 17, 1916, a powerful, radical, and far-reaching measure, which provided for twelve great Federal Land Banks, each with a capital of \$750,000 supplied by the Federal Government, which waives all right to dividends. A Federal Farm Loan Board assigned the forty-eight States to twelve districts, and located the twelve Federal Banks in the cities of Springfield, Mass.; Baltimore, Md.; Columbia, S. C.; Louisville, Ky.; New Orleans, La.; St. Louis, Mo.; St. Paul, Minn.; Omaha, Neb.; Wichita, Kans.; Houston, Tex.; Berk-



*Sculptured Stones with Runic Inscriptions, Isle of Man.*

edge and wisdom. Oracular proverbial sayings were 'runes'; and the magic drum of the Lapps was the rune drum. Eventually the term came to denote exclusively the letters of the Northern (Norrène) alphabet, called



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Careful grading and inspecting of Viscose Manufacture of Rayon Yarn.

eley, Cal.; and Spokane, Wash. In 1923, twelve intermediate credit banks were established to assist in the operation of the twelve land banks. See also UNITED STATES, NEW DEAL.

**Rural Schools.** Rural schools may be defined as schools in country districts. Considerable thought has been given in recent years to the needed reorganization and improvement of rural schools by providing better buildings and better trained teachers, and by standardizing schools. But it is recognized that the problems involved are not educational merely, but a part of the wider problem of improving country life in general throughout the country. To this improvement such organizations as the General Educational Board and the Division of Rural Education in the U. S. Bureau of Education are bending their efforts.

**Rusby, Henry Hurd** (1855-1940), American botanist, born in Franklin, N. J., and graduated from New York University (M.D. 1885). From 1888-1930 he was professor of botany, physiology, and materia medica at Columbia University, and from 1897 to 1902 was also professor of materia medica at Bellevue Hospital Medical College. In 1907-09 he was connected with the U. S. Bureau of Chemistry as an expert on drug products. He has written widely on medical subjects connected with plant life.

**Rush, Benjamin** (1745-1813), American physician and patriot. Elected a member of the Continental Congress, he signed the Declaration of Independence (1776). In April, 1777, he was appointed surgeon-general, and in July physician-general, of the Continental Army. He was a founder of Dickinson College, of the Philadelphia dispensary, the first in the United States, and of the College of Physicians, and was active in the establishment of public schools.

**Rush, Richard** (1780-1859), American lawyer and diplomat, in 1817 was for a short time acting Secretary of State, and was then sent as Minister to England, where he remained until 1825.

**Rush-Bagot Convention.** After the War of 1812, Sir Charles Bagot signed with Acting Secretary Richard Rush an agreement, revocable at six months' notice, that each nation might build or keep on the Lakes only four vessels with one 18-pounder each. Revenue cutters and training ships were not barred. This Convention has never been revoked, and during the century of its existence

has been an immense gain toward peace.

**Rusk, Jeremiah McLain** (1830-93), American soldier and legislator, was born in Morgan co., O., and was occupied as a farmer in early life. In 1871-6 he was a Member of Congress; in 1881 was elected governor of Wisconsin, and twice re-elected; and from 1889 to 1893 was the first Secretary of the Department of Agriculture.

**Rusk, William** (1756-1833), American sculptor, born in Philadelphia, the son of a ship's carpenter. Among his earliest works were the fine figureheads for the American frigates *United States* and *Constitution*. A full-length statue of Washington for Independence Hall in Philadelphia (1814) is considered his masterpiece.

**Ruskin, John** (1819-1900), English author and art critic, came into general notice with *Modern Painters* and other treatises on the fine arts; in later life he was best known as a lecturer and essayist on ethics, education, and philanthropy. He was born in London. He had long been an admirer of the pictures of Turner and impatient at the popular misunderstanding of what he conceived to be the painter's aims in his later work. Ruskin's interest in architecture produced *The Seven Lamps of Architecture* (1849) and *The Stones of Venice*. These books were not merely a plea for Gothic forms in building, but an attempt to trace the conditions of artistic craftsmanship, which the author found in the social system of the Middle Ages. This line of thought was partly developed in *Lectures on Architecture and Painting*, given at Edinburgh in 1853; in *The Political Economy of Art*, lectures at Manchester in 1857; and in *The Two Paths*, in 1859. When the Pre-Raphaelites came into notice, Ruskin took up their cause, and promoted it with both his purse and his pen. Carlyle's influence contributed to develop his range of thought from art to social and economic studies. In December, 1864, Ruskin addressed Manchester audiences on the use of books and the influence of women, and published the discourses as *Sesame and Lilies* (1865). At the same time he was writing his monthly *Letters to the Working Men of England*, under the title of *Fors Clavigera*. In 1871 he bought a cottage—Brantwood, on Coniston Water—and spent the next four years chiefly at Coniston, occupied in work for his St. George's Guild. He promoted art classes and home industries—notably the hand-spinning and weaving of linen. His *Complete Works* appeared in 1904-6.